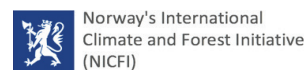




Provision of adequate tree seed portfolios



Assessment of needs and preparation of plans for upgrading of physical facilities at CEE-FRC and the four RSCs

Consultancy Report

22 October to 21 November 2017.

TECHNICAL

Report on

PATSPO Consultancy on assessment of needs and preparation of plans for upgrading of physical facilities at TSTC and the four RSCs

22 October to 21 November 2017.

Introduction

This report presents the findings and recommendations of the consultants Poul Elgaard and Kinyanjui Zakayo, who visited Ethiopia between 22 October and 10 November 2017 and assessed facilities at TSTC and four RSCs in accordance with the ToR of the consultancy.

Briefing- and debriefing meetings were held upon arrival and departure respectively with Kiros Hagdu, Project Director, PATSPO, Nigusse Hagazi, Coordination Officer, PATSPO and Søren Moestrup, Senior Team Leader, PATSPO.

The consultants visited the TSC under FRC in Addis Ababa and the four regional tree seed centres (RTSC) in Bahir Dar, Mekele, Sebeta and Awassa to assess the current situation regarding equipment and infrastructure related to tasks of the centres. Recommendations made for upgrading and purchasing of equipment for each centre individually are presented in this report.

The consultants would like to express their sincere thanks to PATSPO and in particular Sime Mekdes, Samuel Hailu and Bekele Achame for all the operational and logistical support received during their stay in Ethiopia.

The findings and recommendations from the visits to the centres are presented on the following pages and in the appendices. *See Annex 1. TOR*

A. TSC at FRC, Addis Ababa; visited 4 and 6 October and 10 November

See Appendix A for Persons met.

1. Seed processing and extraction facilities.

The TSC is on an annual basis processing approximately 10 tons of pure seed, of which 30% is received as clean seed and the rest as dry or wet fruit.

The building facilities are old and need minor repairs and expansion. The seed cleaning and extraction equipment is sufficient and need only minor repairs. A major problem is that a substantial number of old and non-functioning equipment are stored in the rooms and outdoor facilities meant for seed processing. This old equipment should be removed from the FRS compound.

As the TSC has existed for a considerable amount of time, most of the staff have a quite good experience and understanding for their work.

It is our conclusion that with a better utilization of the existing facilities and with the suggested expansion of the drying area, then the TSC will have sufficient facilities for seed processing for the coming years.

The existing machinery for seed cleaning and grading are in good condition and have hardly ever been used.

With the combination of using the existing machinery and manual cleaning, the TSC will have a considerable capacity for handling larger amount of forest seed, in the years to come. *See appendix B (Proposed renovation), Appendix H (Seed Collection) and App. J (Equipment to be repaired)*

2. Seed testing

The seed testing at the TSC is at present divided into 3 separate functions, each having its own facilities and staffing.

a. Seed moisture room

The seed moisture room is equipped with the basic equipment required for carrying out seed moisture tests. However, to make optimal use of the available space for routine work in the lab, it is recommended that all old equipment, that is no longer functioning, be removed from the room.. *See Appendix C (Proposed seed testing)*

The staff have a good understanding and knowledge of their work for carrying out the moisture tests.

b. Seed Purity Room

The seed purity room has sufficient equipment, which is functioning well, to carry out seed purity tests. However, it is recommended that all old equipment, that is no longer functioning, be removed from the room, so it is not taking up space. See Appendix C. (Proposed seed testing..)

c. Seed germination room

The seed germination facilities at the TSC are old, and a total renovation of the room is recommended. This includes existing benches and furniture removed and replaced with new benches and working tables and only necessary and fully functioning equipment re-installed, - and this equipment is sufficient to do the needed germination tests. See *Appendix C (Proposed seed testing ..), Design C1 & Design C2*

- All electrical installations must be checked and repaired to correct any electrical faults.
- Under the present conditions, germination tests are carried out, but not under optimal conditions.

3. Seed storage.

The cold stores at the TSC are not functioning and seems not to have been running for a considerable amount of time.

Altogether, there are four cold stores; two of them have cooling systems that most likely can be repaired, whereas the two others most likely have to be replaced.

All electrical installations must be checked and repaired, for any electrical circuit.

See Appendix E (Species list..) & Appendix F (Extension and renovation)

4. Conclusion.

The main conclusions and recommendation for the TSC at FRC are:

- With a better use of the existing facilities/equipment and with the suggested expansion of the drying area, and repair of some equipment, the TSC will have a considerable capacity for handling larger amount of forest seed, in the years to come.
- The new design and replacement of the furniture in seed germination laboratory and purchasing of some new equipment will result in a modern and fully functional germination laboratory.
- The other laboratories will need clean up and removal of old not functioning equipment.
- All four cold store rooms will have to be checked by qualified technicians and the needed repair and exchange of spare parts done.

- There is considerable need for capacity strengthening, and for introducing more efficient procedures for registration and documentation of the individual seed lots, throughout the whole sequence of collection, transporting, processing, testing, storing, packing and distributing the seed.

An overriding problem in the TSC is lack of maintenance. It is highly recommended that the TSC NEEDS to establish a periodic maintenance system for all its equipment and for the cold rooms this is in particular important. The budget for maintenance HAS to be made available.

The recommendations made in this report will bring the TSC up to a good technical standard and enable the center to do all standard routine activities from processing to dispatch of quality seed in a professional manner.

PATSPO will carefully follow the work of the TSC and assess if additional support for equipment and facilities will be required.

B. RTSC, Bahir Dar, Amhara, visited 26-27 October.

See Appendix A for Persons met..

1. Seed processing and extraction facilities.

- The Seed Center has been operating since 2014
- The seed processing facilities at Amhara are sufficient, as most of the seed is received as clean seed or semi processed seed, as most of the seed is processed in the field with the cooperation of local farmers.
- The buildings for seed processing and extraction are in good conditions, but there is a need for more storage capacity at ambient temperature, so it is recommended that the Sundry Hall with minor changes in the constructions is changed into a storage room. The same applies for the Material Store, which is already used for storage of seed at ambient temperature.
- The existing machinery for seed cleaning and grading is in good conditions, and has hardly been used.
- The combination of using the existing machinery and manual cleaning gives the Centre's a considerable capacity for handling large amounts of forest seed and this capacity will be sufficient for years to come.
- However, a more detailed seed collection plan, compared to the actual demand will at the present time, reduce the demand for extra storage capacity significantly..

2. Seed testing

Seed germination room

- The seed germination facilities are in acceptable working conditions and need only some minor additional equipment to be fully functioning. *See App. C1. Equipment for seed testing.*

3. Seed storage.

- The cold stores consist of four individual cold stores and none of them is functioning now.
- All electrical installations must be checked and repaired, to correct any electrical faults.
- See App.D1 Storage and packing and App. E Spices list & App. G General equipment.

4. Conclusion.

Besides some minor changes of the Sundry Hall, so it can be used as seed store at ambient temperature and installation of minor new equipment in the Laboratory, there is considerable need for capacity strengthening on all levels in the Seed Center.

There is also an urgent need for improving the seed documentation system, registration and documentation of the individual seed lots, throughout the whole sequence of collection, transporting, processing, testing, storing, packing and distributing the seed.

C. RTSC, Mekele, Tigray, visited 30-31 /Oktober.

See Appendix A for Persons met.

1. Seed processing and extraction facilities.

- The seed processing facilities at Mekele, Tigray have not yet been put into use, and therefor there are no activities at the present time.
- In general, the buildings are in good condition.

The machinery for seed cleaning and grading are still unpacked and kept in the transport crates. Therefore, it is not possible to estimate the exact amount of equipment. According to the Inventory lists, the equipment should be sufficient to do seed processing and testing. However, the inventory lists have shown not be complete at some of the other regional seed centers.

2. Seed germination room

- NO furniture such as benches, cupboards, chairs and tables are installed in the room. it is recommended that benches and cabinets be installed as per Appendix C2 (Proposed Seed Testing Laboratory Design for Regional Tree Seed Centre in Mekele, Tigray Region) and C3 (proposed wall cabinets design for regional tree seed centre in Mekele, Tigray Region) The germination equipment is there but unpacked. See Appendix C1 (List of Seed testing equipment and availability in each forest seed centre in Ethiopia)

3. Seed storage.

- The cold stores consist of two individual stores and none of them is functioning. Although the cold stores are completely new, it is recommended that the cooling- and the electric system are checked before start, as the installations might not have been installed correctly. The two cold stores need have shelves installed. See Appendices D1 for available equipment and D2 for proposed cold store shelving. See also Appendix E for species list.

4. Conclusion.

As the Seed Centre is not yet operating and no staff is employed at the Centre. It is to be expected that a consider has not yet able amount of capacity strengthening will be needed. The equipment for seed processing and seed testing has not yet been unpacked. Or though we did receive an inventory list, it is uncertain if it is complete.

RSC, Awassa, SNNP, visited 2-3 November.

1. See Appendix A for Persons met. Seed processing and extraction facilities.

- The Seed Center has been operating since 2014 and is today fully staffed and working in close cooperation with farmer cooperatives.
- The seed processing facilities at the Centre are sufficient, as 50% of the seed is received as clean seed, as it is being processed in the field. However, there are important spices, such as *Juniperus procera*, being processed at the seed center, and here the de-pulping machine would be useful. *See App.B1*
- The building facilities are in good conditions, but as there is a need for more storage capacity at ambient temperature. At the moment the Material Store is used for storage of clean seed, if shelves are installed the storage capacity will increase considerable and the need for more storage capacity be met.
- The existing machinery for seed cleaning and grading are in good condition, and have only been used sporadically.
- The combination of using the existing machinery and manual cleaning, gives the centre a considerable capacity for handling large amounts of forest seed and this capacity will be sufficient for years to come.

2. Seed germination room

- The seed germination facilities is not functioning as to the equipment is not fully installed and the laboratory is used as storeroom for equipment.
- There is a need for more basal equipment, for carrying out seed testing at an acceptable level. *See App. C1 Lab Equipment for testing.*

3. Seed storage.

- The cold stores consist of two individual cold store rooms and none of them are functioning
- The cold stores need to be equipped with selves.
- All electrical installations must be checked and repaired, for any electrical circuit.
- The ramp at the entrance to the cold store rooms should be used as packing and storage area for seed ready to be dispatched to customers. *See App. D1. Storage and packing App. D1 Spices list .*

4. Conclusion.

Besides installing a limited amount of new equipment, there is a considerable need for capacity strengthening, in seed processing, testing and storage. Furthermore, it is necessary to introduce an efficient procedure for registration and handling the different seed lots and a complete seed documentation system have to be established.

RSC, Sebeta, Oromia, visited 7-8. November.

1. See Appendix A for Persons met. Seed processing and extraction facilities.

- The Seed Center has been operating since 2014
- The seed processing facilities are sufficient, as most seed is received clean or semi processed as the seed is processed in the field.
- The construction of the building is quite poor, and on several of the buildings, the roof have to be extended to prevent rainwater to enter into the buildings.
- There is a need for more storage capacity at ambient temperature, so it is recommended that the Sundry Hall #2, with minor changes in constructions, being used a storage room. The same for the Material Store that is already used for storage of seed at an ambient temperature. In booth stores shelves need to be installed to maximize the storage capacity.
- The existing machinery for seed cleaning and grading are in good conditions, and have hardly been used. Additional equipment for the existing machinery is needed such as extra sieves.
- The combination of using the existing machinery and manual cleaning, gives the centre a considerable capacity for handling large amounts of forest seed and this capacity will be sufficient for years to come.

2. Seed germination room

- The seed germination facilities are in place but not operational, due to lack of knowledge of the staff. There is only a need for minor additional equipment. See App. CI

3. Seed storage.

- The cold stores consist of two individual stores and none of them are functioning and being used for seed storage at the time of our visit.
- All electrical installations must be checked and repaired, for any electrical short circuit.

The ramp at the entrance to the cold store rooms should be used as packing and storage area for seed ready to be dispatched to customers. See App. D1 Storage and packing, App. D2 Proposed cold store shelving & App. E Spices list.

4. Conclusion.

Besides some minor changes of the Sundry Hall and installing shelves, and a few new equipment, there is considerable need for capacity strengthening. There is also a need to introduce a more efficient procedure for registration and handling the individual seed lots throughout the sequence of activities in the Seed center.

Overall conclusions for all five centres.

1. There is a considerable need for capacity strengthening in seed processing, testing and storage.
2. Strengthen the centers with focus on management and managing seed stock and sale.
3. There is an urgent need for at all five Seed Centers for having budget for maintenance of equipment and infrastructure; otherwise, the seed centers will never be sustainable institutions.
4. There is a need for a more consistent seed documentation system, from establishing seed source records, to the seed is delivered to the customers with a clear identification of seed lot.
5. The storage capacity can be increased considerably, by installing more shelves in the existing cold stores, and with minor changes, use existing buildings for seed storage at ambient temperature.
6. It is our belief, that the seed in storage, have a high purity percentage, but unfortunately it is difficult to estimate the germination percentage/quality, because of lack of germination results and labelling.

Appendices:

Annex 1. ToR

APP. A. Persons meet at each Seed Centre

App. B1 Proposed renovation of seed processing area at EEFRI TSTC

App. C Proposed seed testing Laboratory new design for EEFRI TSTC

App. C1 Lab. Equipment for seed testing

App. C2 Proposed seed testing laboratory design for regional tree seed Centre in Mekele,

App. C3 Proposed wall cabinets design for Regional Tree Seed Centre in Mekele, Tigray Region

App. D1 Storage and packing

App. D2 Proposed cold store shelving at Mekele and Dima Tree Seed Centre's

App. E Species lists

App. F Extensions and renovation

App. G Seed processing and other general equipment

App. H Seed Collection equipment

App. I Overall list of equipment prioritized

App. J Equipment to be repaired

Annex 1: ToR

Provision of Adequate Tree Seed Portfolios (PATSPO) in Ethiopia, 2017-2020

TERMS OF REFERENCE

Consultancy on assessment of needs and preparation of plans for upgrading of physical facilities at TSTC and the four RSCs

(October/November 2017)

1. BACKGROUND

Provision of Adequate Tree Seed Portfolios (PATSPO) to enhance productivity and resilience of Forest Landscape Restoration in Ethiopia is a project supported by a grant from the Government of Norway through the Norwegian International Climate and Forest Initiative (NICFI). The project is implemented by the World Agroforestry Centre (the International Centre for Research in Agroforestry - ICRAF) in close collaboration with the Ethiopia Environment and Forest Research Institute (EEFRI) under the Ministry of Environment, Forest and Climate Change (MEFCC), and other institutions working in the tree seed sector in Ethiopia. PATSPO is a four year project 2017 – 2020 based on an agreement between the Royal Norwegian Embassy in Ethiopia (RNE) and ICRAF.

PATSPO is designed to support Ethiopia in its ambitious programmes of forest landscape restoration with a commitment to restore more than 20 million ha of degraded forest landscapes within the next 20 years.

A major challenge of forest landscape restoration work is that it generally requires the use of planting material in large quantities of a broad spectrum of genetically diverse, healthy and productive tree species.

PATSPO addresses this major challenge by providing a multiple tree species programme able to provide:

1. organizational setup of the tree seed sector, including stakeholder identification and roles and responsibilities, based on a sector analysis;
2. species specific knowledge for most priority tree species;
3. a built up of the tree genetic resources for the future, comprising exploration, mobilisation, conservation, establishment, management and improvement; and
4. capacity to monitor and deliver quality seed and seedlings of multiple species required for large scale restoration.

The capacity-building component of PATSPO includes support to physical upgrading of the Tree Seed Technology Coordination (TSTC) unit of EEFRI and the four Regional Tree Seed Centres (RSCs). This support will be based on a thorough and detailed assessment of existing facilities and its condition in relation to the tasks and functions of – and the human resources available at the institutions/centres, as well as the budget allocation made available in the PATSPO Project.

This consultancy supports delivery in output area number four mentioned above.

Further background information is available in the Project Document and references therein which should be consulted.

2. OBJECTIVE

The objective of the consultancy is:

‘Physical upgrading of the facilities (equipment and minor construction) at TSTC and the four RSCs leading to a well-functioning tree seed sector providing larger quantities of quality seed in support of forest landscape restoration and other tree planting efforts in Ethiopia’

3. METHOD OF WORK

The consultants and resource persons will work as a team following the TOR and guidance from the PMT. The consultants will visit the TSTC and preferably all four RSCs.

A briefing meeting will be held with the PATSPO staff in the beginning of the consultancy, where the TOR will be further discussed and the itinerary for the consultancy finally decided upon. A debriefing meeting will be arranged at the end for the consultancy to present their preliminary findings and conclusions for comments by the PATSPO staff.

4. OUTPUTS

The consultants will deliver the following outputs:

A consolidated report including the following in details:

- a) a list of required equipment and minor constructions directly linked to the roles and functions of TSTC and the four RSCs;
- b) an assessment of the existing equipment and at TSTC and each of the four RSCs in terms of numbers and condition;
- c) a prioritized and specified (producer etc.) list of equipment recommended for procurement for TSTC and each of the four RSCs.

5. ACTIVITIES

The activities of the consultants will include, but not necessary be limited to:

- a) define and describe the major functions of the TSTC and the four RSC;

- b) assess the requirements for equipment and minor constructions needed to fulfil the described functions;
- c) prepare a prioritized list of required equipment and minor constructions - ref. b);
- d) assess the existing equipment at the TSTC and the four RSCs in terms of numbers and condition as compared to the required equipment;
- e) compare existing equipment with required equipment and prepare a detailed list of equipment for the TSTC and each of the four RSCs recommend for procurement by PATSPO. The list shall also include minor constructions recommended.

6. STAFFING AND QUALIFICATIONS

The team will consist of three experts. The combined team includes the following expertise:

- Applied tree seed centre and gene bank management
- Seed technology and seed physiology
- Seed processing and handling
- Tree seed laboratory operations and management
- Applied tree breeding

One consultant from UCPH, one from ICRAF Nairobi and one resource person from PATSPO or relevant institution in Ethiopia.

The consultant from UCPH will be Mr. Poul Elgaard, who has a forestry background and substantial experience and knowledge on the particular topic of operating and maintaining tree seed producing facilities in Central America as well as in Denmark, including seed research laboratories.

The consultant from ICRAF Nairobi will be Zakayo Kinyanjui, who has excellent experience in operating the tree seed laboratory at ICRAF, Nairobi.

The resource person from Ethiopia to be identified.

7. TIMING AND DURATION OF THE ASSIGNMENT

The duration and timing of the consultancy will be of one month from 22 October to 21 November 2017. Approximately three weeks will be spent in Ethiopia and one week in Denmark and Kenya respectively for reporting.

8. REPORTING

The consultant will prepare a consolidated report on needs for equipment and minor constructions at the TSTC and the four RSCs with the contents as mentioned under point 4.

The consultant will present and discuss the contents of the report with the PATSPO PMT before departure from Ethiopia, and a draft report submitted to PATSPO 10 days later. PATSPO will

provide comments to the report one week after receiving the draft and the consultant will submit the final report one week later.

A note on general requirements (including quality) and guidelines for travel (BtO) and consultancy reports to PATSPO is provided under separate cover in appendix 1.

PATSPO will arrange for the design of the report before publishing.

9. SUPPORT FROM PATSPO

PATSPO will support the consultants and the resource person in organizing itinerary and meeting plan, as well as booking hotels and domestic flights. Relevant background information will be made available.

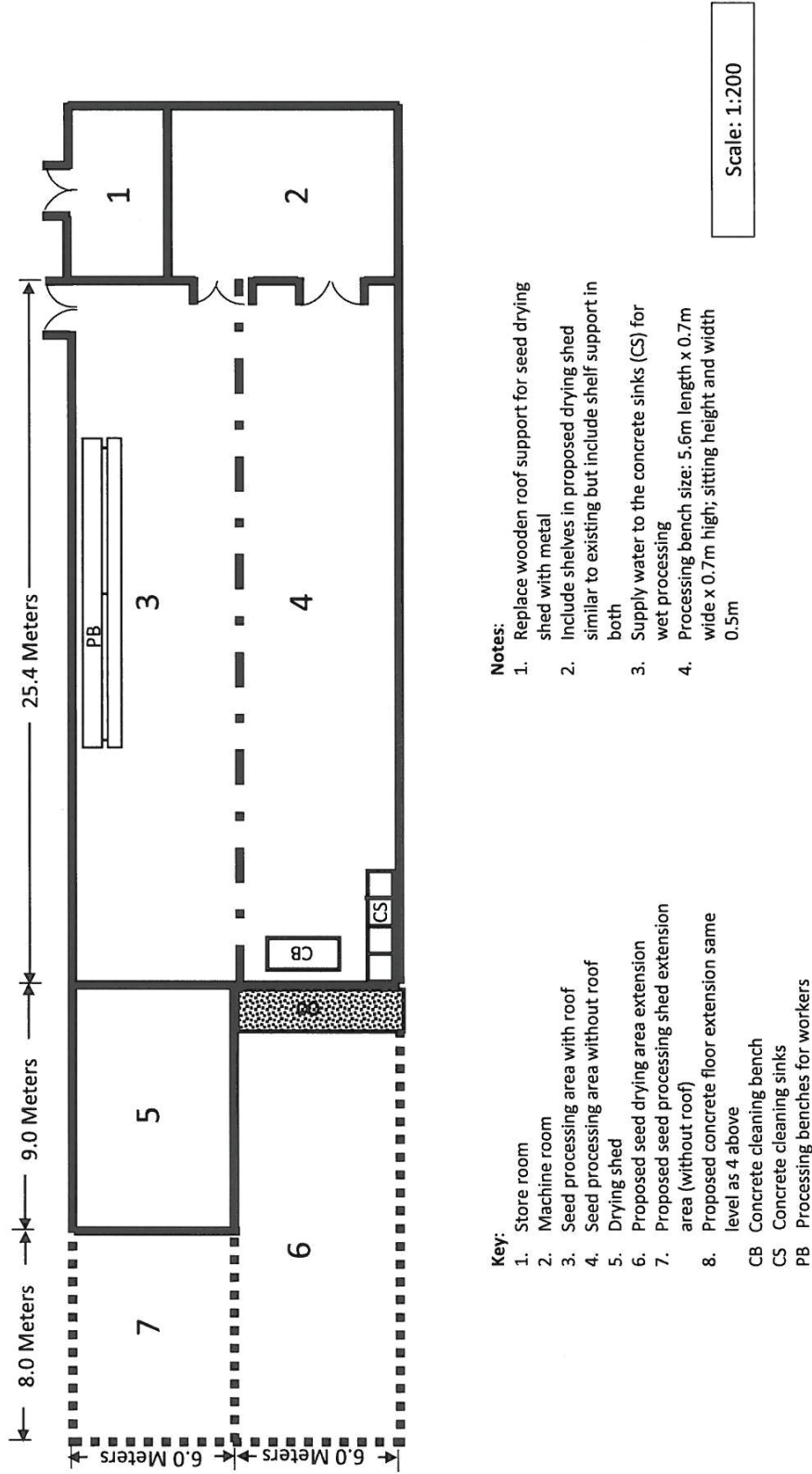
When in Addis Ababa the consultant will work from the ICRAF Office at the ILRI Compound.

Appendix A: National and regional forest tree teams that the consultants met during visits to the respective centres

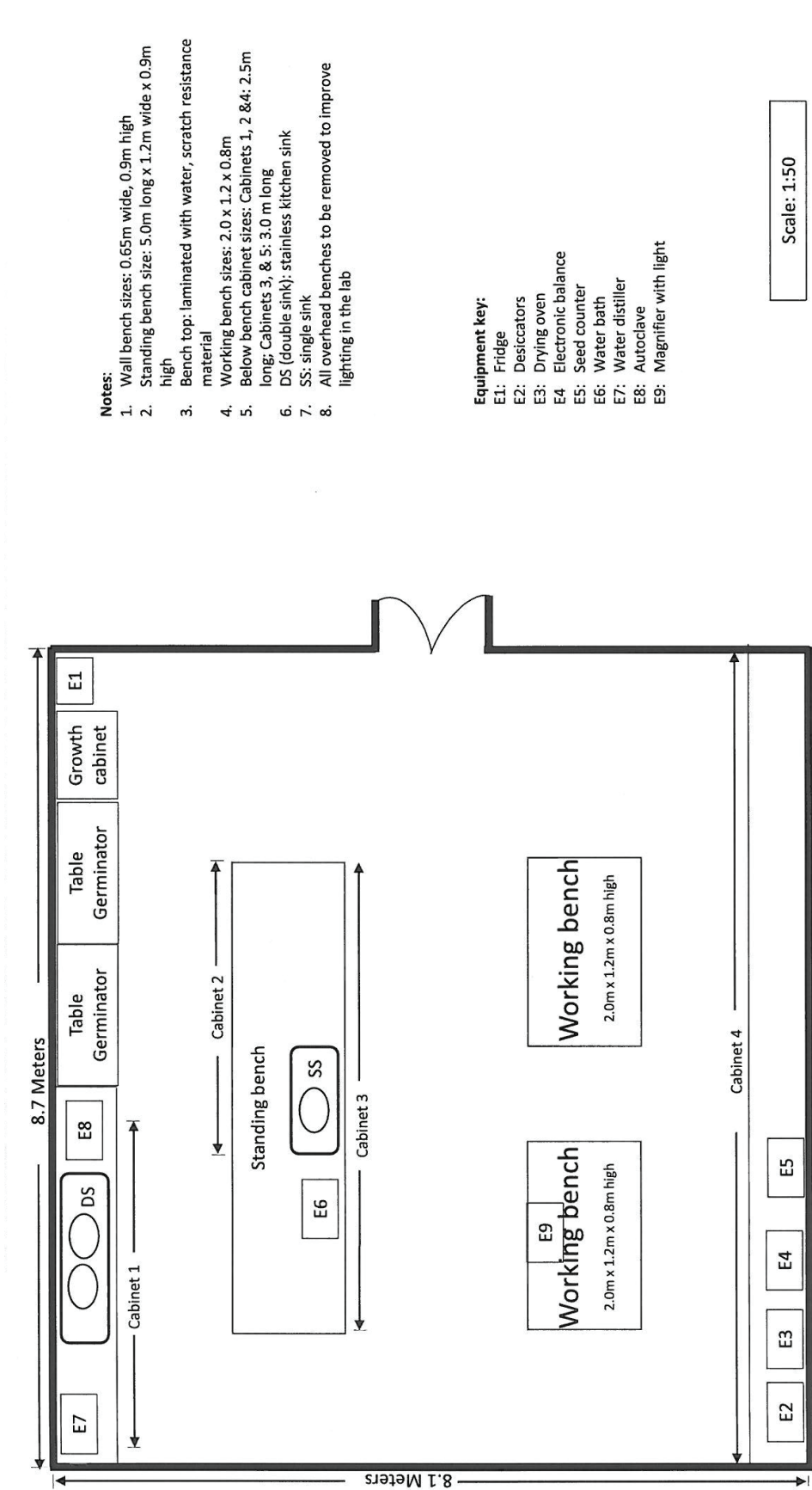
No	Name	Centre/Institute/Ministry	Region	Position	Phone	Email
1	Meselefe Arafaw	Amhara Forest Enterprise Tree Seed Centre	Amhara	Expert	0918449608	mess66ikonjo27@gmail.com
2	Chalie Beyene	Amhara Forest Enterprise Tree Seed Centre	Amhara	Head		
3	Elay Astaw	South Regional Forest Seed Centre	Hawasa	Head		belayastaw21@gmail.com
4	Tseguye Fikadu	South Regional Forest Seed Centre	Hawasa	Expert		tseguye_f@yahoo.com
5	Mintamire Lemaitke	South Regional Forest Seed Centre	Hawasa	Expert	0943220901	mintlemay@yahoo.com
6	Wubalem	EEFRI	National	Director General		
7	Wondessen Gebretsadik	EEFRI, TSTC	National	Center Director		wondi27@gmail.com
8	Kedra Mohammed	EEFRI, TSTC	National	Process Representative		kedramohammed@gmail.com
9	Almaz Teklemariam	EEFRI, TSTC	National	Purity expert		
10	Yeshi Ketema	EEFRI, TSTC	National	Moisture expert		
11	Etetu Maruta	EEFRI, TSTC	National	Germination expert		
12	Amelework Zenebe	EEFRI, TSTC	National	Germination expert		
13	Aynalem Tekeba	EEFRI, TSTC	National	Processing coordinator		
14	Terusew Alemneh	EEFRI, TSTC	National	Cold store		
15	Amsale wondimu	EEFRI, TSTC	National	Cold store		
16	Yami Regassa	EEFRI, TSTC	National	Seed collector		
17	Gemechu Guta	EEFRI, TSTC	National	Seed collector		
18	Yigardu Mengesha	EEFRI, TSTC	National	Director, TSTC Unit		yigardumulatu@gmail.com

19	Kedra	EEFRI, TSTC	National	Head, Seed Section		
20	Abrehet Gebrehiwot	Forest Development & Management Directorate	National	Director	251-913-322- 298	gebrehiwotabrehet6@gmail.com
21	H.E. Kebede Yimam	MEFCC	National	State Minister		
22	Fikru Bulita	Dima Seed Processing and Storage Centre	Oromia	Expert	0911972188	
23	Alemayehu Heile Selassie	Dima Seed Processing and Storage Centre	Oromia	Head		alemayehu658@gmail.com
24	Fenet Daba	Dima Seed Processing and Storage Centre	Oromia	Expert	0919113299	
25	Wasihur Weiknel	Dima Seed Processing and Storage Centre	Oromia	Expert	0916047384	
26	Mitiku Haile	Mekele University	Tigray	Professor		
27	Kiflom Abadi	Natural Resource Management	Tigray	Director		
28	Nigussie Esmiel	Tigray Tree Seed Centre	Tigray	Head		

Appendix B1: Proposed renovation of Seed Processing area at EEFRI TSTC



Appendix C: Proposed seed testing laboratory design for EEFRI TSTC



APPENDIX B: Renovations of facilities proposed for each of the forest seed centres in Ethiopia

Item	Required	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oroomia	RTSC Mekele	Remarks
field collection stations	Construction of shade for temporary storage			Needed			
space expansion	Extension of existing seed processing area	Needed	Needed	Needed	Needed		see design appendix B2
renovation/adjustments	add new benches, cabinets, working benches	Needed	Needed	Needed	Needed	Needed	see design appendices C2, C3, C4, C5
electrical installation	inspect, renovate all electrical installations in the seed testing laboratory	Needed					
repainting	repaint walls and ceilings	Needed	Needed	Needed	Needed	Needed	
sun drying hall	seal the walls, fit door, add ventilation at the gable	N/A	Needed				
threshing room	extend roof by at least 10 x 2m at 45° angle on the two gable sides to reduce direct sunlight	Needed	Needed	Needed	Needed		
cold store	erect walls on two open sides and move the existing sliding door to the rump side. The new space to be used for packing and dispatching of seed. Add windows.	N/A		Needed	Needed		
cold store	add steel adjustable shelves including the area adjacent to two cold rooms	Needed		Needed	needed		See appendix D2
staff welfare	establish cafeteria for 23 staff members						
seedling production	establish a seedling nursery		needed				
staff welfare	establish a shed for tea and lunch break	Needed					

APPENDIX_C1_List of Seed Testing Equipment and availability in each of the forest seed centres in Ethiopia

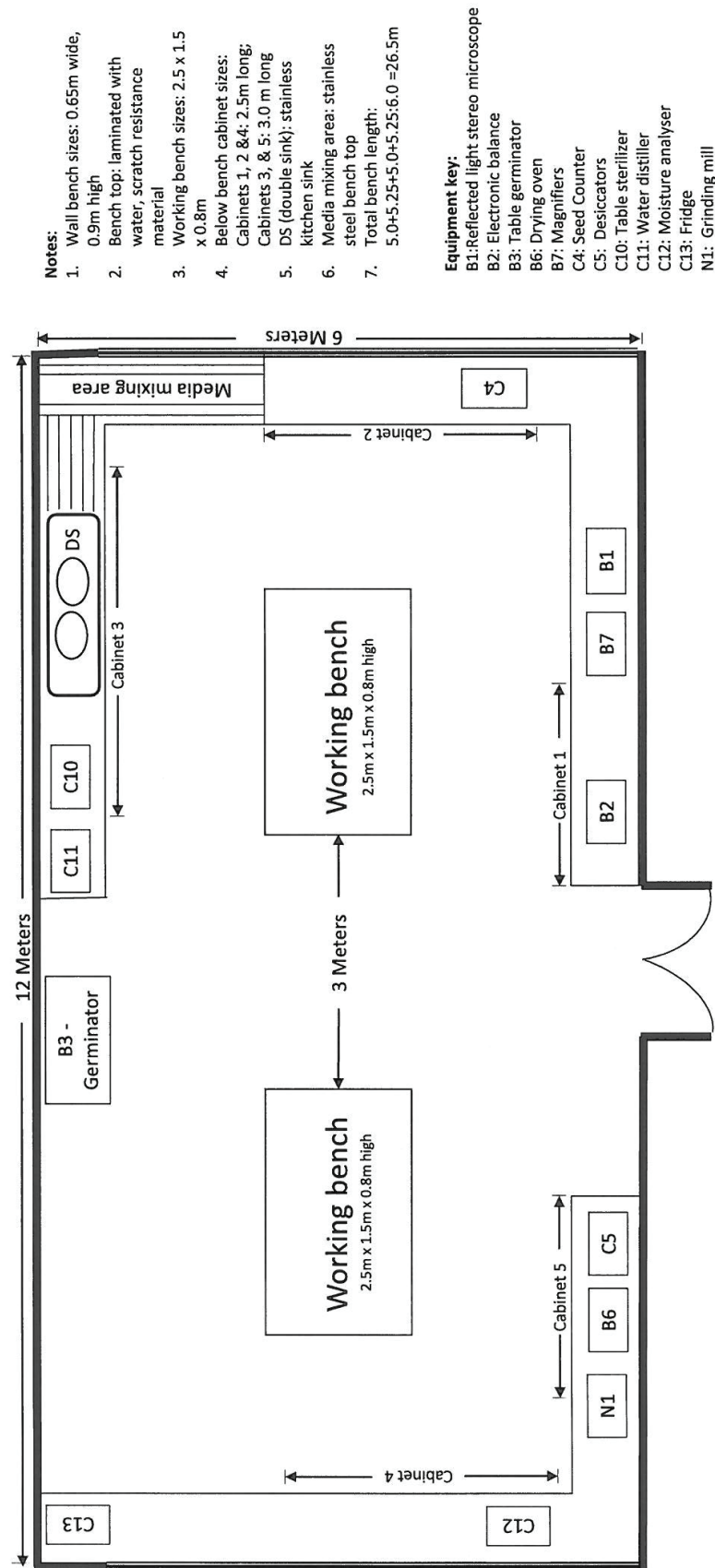
No	Equipment and supplies	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oromia	RTSC Mekele	Remarks	Required No.
1	Magnifier - Circular illuminated	1	Available/needed	Available/needed	Needed	Available	Available		3
2	Autoclave - Table sterilizer with accessory	1	Available (2)	Available	Available	Available	Available		
3	Bunsen Burner with tap and low flame	1	Available	available	available	Available	Available		
4	Dessicators	2	Available	Available	Available	Available	Available		
5	Distilling unit - Monodust	1	Available/needed	Available	Available	Available/Needed	Available	Unit at TSTC and Dima has not accessories. Install and replaced if not working	2
6	Drying oven	1	Needed	Available	Available	Available	Available		1
7	Electronic balance - big seed - max 1000g	1	Available/Needed	Available	Needed	Needed	Available		3
8	Electronic balance - small seed - 0.01 - 120g	1	Available/needed	Needed	Needed	Needed	Available		4
9	Filter paper - 615. ø120mm	1000	Available/needed	Needed	Needed	Needed	Available/needed		5000
10	Filter paper - 615. ø150mm	1000	Needed	Needed	Needed	Needed	Needed		5000
11	Filter paper - 615. ø80-90mm	1000	Available	N/A	N/A	N/A	Available		

No	Equipment and supplies	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oromia	RTSC Mekele	Remarks	Required No.
12	Germination table with lighting	1	Available (2)	Available	Available	Available	Available		
13	Manual (hand) counter	5	Available	Available	Available	Available	Available		
14	Measuring cylinder - glass 1000ml	5	Available	Needed	Needed	Needed	Available		15
15	Moisture analyzer with printer	1	N/A	Available	Available	Available	Available		
16	Refrigerator - cabinet	1	needed	Available	Available	Available	Available	Dispose broken down units at TSTC	1
17	Seed counter - electronic	1	Available	Available	N/A	N/A	Available		
18	Sieves - round (test sieves)	3	N/A	N/A	N/A	N/A	Available		
19	Stereo microscope - reflected light	1	N/A	N/A	N/A	N/A	Available		
20	Stop watch - mechanicaltable top	2	Needed	Available	Available	Needed	Available		4
21	Dissecting kit	set	N/A	N/A	Available	N/A	N/A		
22	Freezer	1	Available	N/A	Available	N/A	N/A		
23	Hand lens - 3.5x, 2.5x	4	N/A	Available	N/A	N/A	N/A		
24	Incubator - UN30	1	Available	N/A	Available	N/A	N/A		
25	Laminar flow hood	1	Available	N/A	N/A	N/A	N/A		
26	seed blower	1	Available	Available	Available	Available	N/A		
27	Seed gun	1	Available	N/A	N/A	N/A	N/A		
28	Shaker	1	Available	N/A	N/A	N/A	N/A		
29	Water bath	1	Available	N/A	N/A	Available	N/A		
30	Beaker - glass - 1000ml	3	Available	Needed	Needed	Needed	Needed		12

No	Equipment and supplies	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oromia	RTSC Mekele	Remarks	Required No.
31	Cleaning brushes: 300 - 500mm	5	Available	Available	Available	Needed	Needed		10
32	Cutting/counting board	2	Needed	Needed	Needed	Needed	Needed		10
33	Dust masks	100	Needed	Needed	Needed	Needed	Needed		500
34	Electric kettle - metallic	1	Needed	Needed	Needed	Needed	Needed		1
35	Eye protection goggles	5	Needed	Available	Needed	Needed	needed		20
36	Forceps - bent blunt	packet	Needed	Needed	Needed	Needed	Needed		5
37	Forceps - straight blunt	packet	Needed	Needed	Needed	Needed	Needed		5
38	Germination cabinet	1	Out of order/needed	Needed	Needed	Available	Needed	Repair 2 Units at TSTC and dispose if not working. Install the 2 units at Dima.	4
39	Germination dishes with transparent cover - 25 x 15 x 10mm	200	Needed	Needed	Needed	Needed	Needed		1000
40	Gloves – latex	200	Needed	Needed	Needed	Needed	Needed		1000
41	Grinding mill	1	Available	Available	Needed	Available	Needed		2
42	Hand sprayer - 1liter	3	Needed	Needed	Needed	Needed	Needed		15
43	Gloves - heat resistant	5	Needed	Available	Needed	Needed	Needed		20
44	Hot plate	1	Available	Needed	Needed	Available	Needed		3
45	Liquid in glass thermometer: - 10 to 200°C	3	Needed	Needed	Needed	Needed	Needed		15

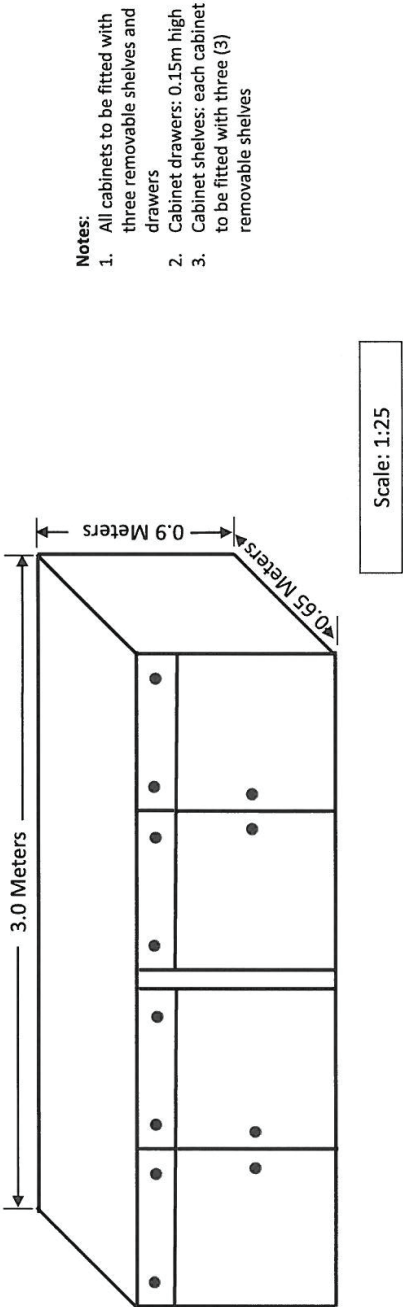
No	Equipment and supplies	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oromia	RTSC Mekele	Remarks	Required No.
46	Maximum minimum thermometer: -30 to 50°C	2	Needed	Needed	Needed	Needed	Needed	Monitoring room temperature	10
47	Nail clipper	5	Needed	Available	Needed	Needed	Needed		25
48	Petri dishes - autoclavable - 120mm x 20mm	500	Needed	Needed	Needed	Needed	Needed		2000
49	Petri dishes - autoclavable - 150mm x 20mm	500	Needed	Needed	Needed	Needed	Needed		2000
50	sampling probes	3	Needed	Needed	Needed	Available	Needed		12
51	Scapel blades – large	1 pkt	Needed	Needed	Needed	Needed	Needed		5
52	Scapel blades – small	1 pkt	Needed	Needed	Needed	Needed	Needed		5
53	Scapel handles	packet	Needed	Needed	Needed	Needed	Needed		5
54	Secateurs	3	Needed	Needed	Needed	Needed	Needed		15
55	Seed divider	1	Available	Needed	Available	Needed	Needed		3
56	Silica gel –blue	4	Needed	Needed	Needed	Needed	Needed		20
57	Spatula spoon	5	Needed	Needed	Available	Needed	Needed		20
58	Stainless steel ruler - 50cm	2	Needed	Needed	Needed	Needed	Needed		10
59	Stainless steel scissors - different sizes	5	Needed	Available	Needed	Needed	Needed		20
60	Alluminium dishes	100	Needed	Needed	Needed	Needed	Needed	Moisture tests	500
61	Filter paper - 615. ø110mm	1000	N/A	Needed	N/A	N/A	N/A		1000

APPENDIX C2: PROPOSED SEED TESTING LABORATORY DESIGN FOR REGIONAL TREE SEED CENTRE IN MEKELE, TIGRAY REGION



Scale: 1:50

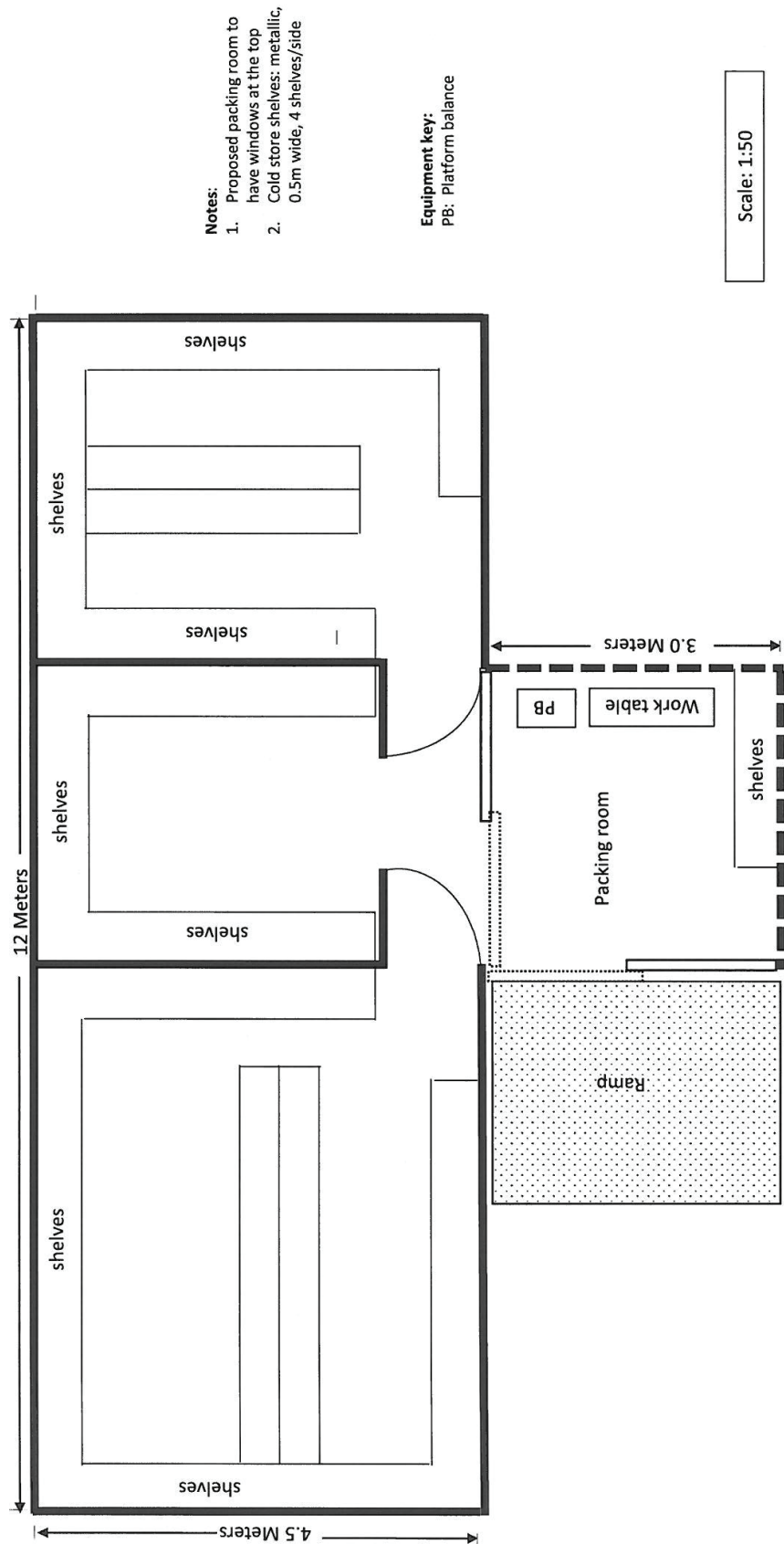
APPENDIX C3: PROPOSED WALL CABINETS DESIGN FOR REGIONAL TREE SEED CENTRE
IN MEKELE, TIGRAY REGION



APPENDIX D: List of Seed storage and packing facilities, and availability in each of the forest seed centres in Ethiopia

No.	Equipment	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oroomia	RTSC Mekele	Required No
1	Plastic container	20	N/A	N/A	Available	Available	Available	
2	plastic tray	20	N/A	N/A	Available	Available	Available	
3	polyethylene bags	600	N/A	N/A	Available	Available	Available	
4	polyethylene bags	1700	N/A	N/A	Available	Available	Available	
5	Sealer (sealing machine with plastic bags)	1	N/A	Available	Available	Available	Available	
6	Air tight plastic barrels - 34l	500	Available	Available	Available	Available	needed	500
7	packing labels	10000	needed	Needed	needed	needed	needed	50000
8	pre-printed Mesh bags - seed packing - 15kg	1000	needed	Needed	needed	needed	needed	4000
9	pre-printed Mesh bags - seed packing - 25kg	1000	needed	Needed	needed	needed	needed	4000
10	pre-printed Mesh bags - seed packing - 5kg	1000	needed	Needed	needed	needed	needed	4000
11	Shelves - Material room	fitting	needed	Needed	needed	needed	needed	
12	Shelves - sun-drying hall	fitting	needed	Needed	needed	needed	needed	
13	shelves cold room	fitting	needed	Needed	Needed		needed	
14	table and chair	1	N/A	N/A	Needed	N/A	needed	1

Appendix D1: Proposed cold store shelving at Mekele and Dima Tree Seed Centre



Appendix E: List of priority species for each of the forest seed centres in Ethiopia

No	Species	TSTC, ADDIS	RTSC BAHIR DAR, Asmara	RTSC HAWASA, SNNP	RTSC SEBETA, Oromia	RTSC Mekele	Score
1	<i>Cordia africana</i>	Yes	Yes		Yes	List	3
2	<i>Cupressus lusitanica</i>	Yes		Yes	Yes		3
3	<i>Grevillea robusta</i>	Yes		Yes	Yes		3
4	<i>Moringa stenopetala</i>	Yes	Yes				3
5	<i>Podocarpus falcatus</i>		Yes	Yes	Yes		3
6	<i>Acacia decurrens</i>		Yes		Yes		2
7	<i>Acacia saligna</i>	Yes	Yes				2
8	<i>Acacia tortilis</i>	Yes		Yes			2
9	<i>Eucalyptus camaldulensis</i>		Yes	Yes			2
10	<i>Eucalyptus globulus</i>			Yes	Yes		2
11	<i>Faidherbia albida</i>		Yes	Yes			2
12	<i>Juniperus procera</i>			Yes	Yes		2
13	<i>Milletia ferruginea</i>	Yes			Yes		2
14	<i>Acacia abyssinica</i>	Yes					1
15	<i>Acacia nilotica</i>		Yes				1
16	<i>Albizia gummifera</i>		Yes				1
17	<i>Casuarina equisetifolia</i>	Yes					1
18	<i>Eucalyptus saligna</i>				Yes		1
19	<i>Hagenia abyssinica</i>			Yes			1
20	<i>Leucaena leucocephala</i>				Yes		1
21	<i>Olea africana</i>		Yes				1
22	<i>Prunus africana</i>			Yes			1

APPENDIX F: Extensions and renovations of facilities proposed for each of the forest seed centres in Ethiopia

Item	Required	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oroomia	RTSC Mekele	Remarks
field collection stations	Construction of shade for temporary storage			Needed			
space expansion	Extension of existing seed processing area	Needed	Needed	Needed	Needed		see design appendix B2
renovation/adjustments	add new benches, cabinets, working benches	Needed	Needed	Needed	Needed		see design appendices C2, C3,
electrical installation	inspect, renovate all electrical installations in the seed testing laboratory	Needed					
repainting	repaint walls and ceilings	Needed	Needed	Needed	Needed		
sun drying hall	seal the walls, fit door, add ventilation at the gable	N/A	Needed				
threshing room	extend roof by at least 10 x 2m at 45° angle on the two gable sides to reduce direct sunlight	Needed	Needed	Needed	Needed		
cold store	erect walls on two open sides and move the existing sliding door to the rump side. The new space to be used for packing and dispatching of seed. Add windows.	N/A		Needed	Needed		
cold store	add steel adjustable shelves including the area adjacent to two cold rooms	Needed		Needed	needed	Needed	See appendix D2
staff welfare	establish cafeteria for 23 staff members						
seedling production	establish a seedling nursery		needed				
staff welfare	establish a shed for tea and lunch break	Needed					

APPENDIX G: List of Seed processing and other general Equipment and availability in each of the forest seed centres in Ethiopia

No	Equipment	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oromia	RTSC Mekele	Required No.
1	Big sieve	5	N/A	N/A	Available	Available	Available	
2	Concrete mixer	1	N/A	Available	Available	N/A	N/A	
3	Gravity separator – BCC	1	N/A	N/A	available	N/A	Needed	1
4	Gravity table	1	N/A	Available - Holland		Available – Holland (sieves needed)	N/A	1 set
5	Kimseed cleaner	1	Available	N/A	N/A	N/A	N/A	
6	Kimseed cleaner/thresher	2	Available	N/A	N/A	N/A	N/A	
7	Manual coffee depulper	1	Available	N/A	Needed	N/A	N/A	1
8	Mechanical platform scale (max. 300kgs)	1	N/A	N/A	N/A	Available	N/A	
9	Mechanical platform scale (max. 100kgs)	1	Available	Available	Available	Available/Needed	Available	1
10	Platform scale (max. 15kgs)	1	Available	Available	Available	Needed	Available	1
11	Portable compressor	1	Available	Needed	Needed	Needed	Needed	4
12	Seed cleaner - 2 screen type - BCC	1	Available - Westroup (2)	Available - Holland	Available	Available - Holland	Available	
13	Shelves - cone store	Fitting	needed	needed	needed	needed	Needed	
14	Shelves for machine room - sieves, spare parts	Fitting	Available	Needed	Needed	Needed	Needed	
15	Shelves temporary storage room	Fitting	Available	Needed	Needed	Needed	Needed	
16	Water barrels (to soak fruit)	5	Available	Available	available	Available	Available	
17	Wet dewinger and seed extractor - BCC	1	N/A	N/A	Available	N/A	N/A	

No	Equipment	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oroomia	RTSC Mekele	Required No.
19	Mini-bus						1	
21	Motorcycles		4	4	4	4	4	16
22	Toyota Highlux Double Cab		?	?	?	?	?	

APPENDIX H: List of Seed Collection Equipment and availability in each of the forest seed centres in Ethiopia

No	Equipment	Quantity	EEFRI, TSTC	Amhara Forest Enterprise Tree Seed Centre	South Regional Forest Seed Centre, Awassa	Dima Seed Processing and Storage Centre, Oroomia	RTSC Mekele	Remarks
1	Climbing sets for tree	2	Available	Inventory list	Available	Available	Available	To estimate the suitable equipment for seed collection it is important to know which tree species that the centre is dealing with
2	Climbing spures	5	Available	not available	Available	Available	Available	
3	Compass	1	Available		Available	Available	Available	
4	Dendrometer	1	Available		Available	Available	Available	
5	Hessian sacks	20	Available		Available	Available	Available	
6	laser height measuring instrument	1	Available		Available	Available	Available	
7	Measurement tapes	2	Available		Available	Available	Available	
8	measuring tape - high precision	1	Available		Available	Available	Available	
9	Saw hooks	2	Available		Available	Available	Available	
10	telescoping poles	5	Available		Available	Available	Available	
11	telescoping pruning saw	5	Available		Available	Available	Available	
12	Tilts - tapaurin	10	Available		Available	Available	Available	
13	Tree climbing ladders	1	Available		Available	Available	Available	
14	Tree pruner	5	Available		Available	Available	Available	

APPENDIX J: Equipment that require repair and/or routine maintenance in each of the forest seed centres in Ethiopia

Item no.	Equipment	Quantity	Kind of repair	TSTC, ADDIS	RTSC BAHIR DAR, Asmara	RTSC HAWASA, SNNP	RTSC SEBETA, Oromia	RTSC Mekele	Remarks	required
1	Germination cabinet	1		Needed						1
2	Laminar air flow hood	1		Needed						1
	Kimp Seed Thrasher	1	Honda Engien Egniscion part	Needed						1
3	cold stores	1	qualified technician to check and service to ensure continuous operation. Regularly service (6 months)	Needed	Needed	Needed	Needed	Needed	Needed	5



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