
**FORESTRY RESEARCH INSTITUTE OF MALAWI (FRIM)**

# ANNUAL PROGRESS REPORT

## JULY 2013 to JUNE 2014

**The Deputy Director of Forestry (Research)- July 2014**

## Our Mission

***To conduct operational forestry research to generate usable technologies and provide information for sustainable management, conservation and utilisation of forests/trees and allied natural resources in order to contribute to improving the welfare of the people of Malawi.***

## Our Vision

***To become a dynamic, high peformance, consultative and client focused authority that promotes, builds and ensures sustainable development, utilisation, protection and mangement of forests to reduce poverty.***

## Our mandate

***To provide information and improved tree germplasm and carry out stakeholder-oriented research on the sustainable management, utilization and conservation of trees and forests in Malawi.***

## 1.0 BACKGROUND

The Forestry Research Institute of Malawi (FRIM) is one of the main sections of the Department of Forestry. The institute was established as a Silvicultural Research Station in Dedza in 1957 under the then, Agricultural Research Council of Central Africa initially to conduct basic research on the management of forest plantations to support aforestation programs of the government.

In the 1960s, FRIM moved its headquarters to Zomba and established regional research centres in Dedza and at Chikangawa and subcentres at Chisasira (Nkhatabay) and Idulusi (Mangochi). Over time, the institute's scope and mandate widened to include formal and informal forestry research on sustainable management, utilisation and conservation of individual trees, trees on farm and natural forests by local communities and a wide range of stakeholders. To address this wider scope, research programs are guided by a Strategic Plan that is developed and reviewed every three years by a National Forestry Research Committee (NFRC) comprising research officers and stakeholders. All research programs fit within one or more of the following well defined strategic areas; Trees on Farm, Plantation, Seed and Tree Improvement and Indigenous Woodland Management.

This report outlines the activities that have been carried out by each strategic area in the 2013/2014 financial year.

# 2.0 SEED AND TREE IMPROVEMENT STRATEGY AREA

**Tembo Chanyenga, Mike Likoswe, Maganizo Namoto, Violet Msukwa and Gloria Makhambera**

## 2.1 Background

The main objective of the Malawi National Tree Seed Centre (MNTSC) is to bridge the gap between demand and availability of tree seeds in Malawi by supplying tree seed of high genetic and physiological quality in sufficient amounts for all afforestation programs taking place in the country. The major output of the MNTSC which is under the Tree Seed and Improvement Strategy Area is to make available appropriate quantities of seeds for various tree planting programmes in Malawi. During the reporting period, activities of the MNTSC achieved the following outputs;

## 2.2 The National Tree Seed Centre

### 2.2.1 Seed Procurement

The 2013-2014 seed collection period has been the best ever in three years. All the seed collection plans were implemented as planned. With funds from the FDMP, IFMSLP and the LCBCCAP, the seed centre managed to acquire 5033.9 kilogrammes of seeds of various tree species (Figure 1, Appendix Table 1). The greatest part of the seed acquisition exercise was supported by the FDMF where 3248.7 kgs were purchased from local tree seed suppliers while 615.2 Kgs were collected by teams in Dedza, Chikangawa and Zomba. A total of 850 kgs were collected with funds from the IFMSLP and 320 kg by the LCBCCAP.

In addition to tree seed collections in Malawi, improved *Pine* seeds were procured from Zimbabwe in the reporting period using funds from the FDMF. A total 40 Kgs were purchased to supplement local seed supply targeting all government plantations. The purchased pine seeds were distributed to Chikangawa, Dedza, Chongoni, Chigumula, Dzondzi-Mvai, Ndirande and Zomba timber plantations.

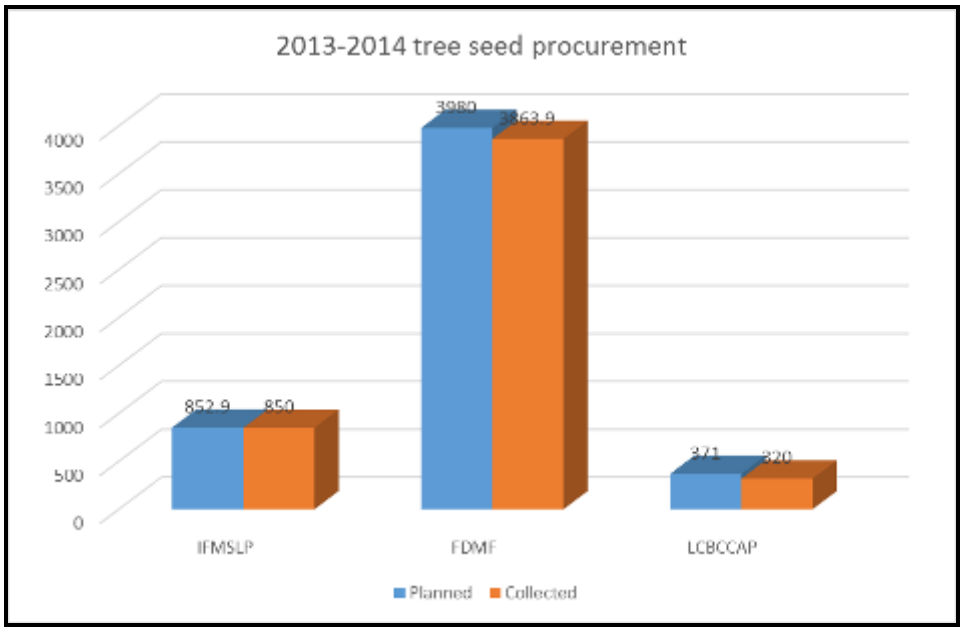


Figure 1. MNTSC 2013-2014 seed procurement

### 2.2.2 Seed Sales and Distribution

During the period (July 2013 – June 2014) 859.8 kgs of different species of tree seeds were sold to various customers at a combined revenue of MK 1,187,940. If properly handled, these seeds could raise around 9,043,000 seedlings. Additionally, 27.7 kgs plantation species and 12.3kgs agroforestry species were freely distributed to Chikangawa, RFO Centre and RFO South. On another note, 711kgs of various species were distributed from the Improved Forest Management for Sustainable Livelihood Project (IFMSLP) with which 16 million seedlings were expected to be raised. The quantities of seeds distributed reflect a high percentage of agroforestry tree species followed by Multipurpose Tree Species (MPTS). (Figure 3 and Appendix table 2).

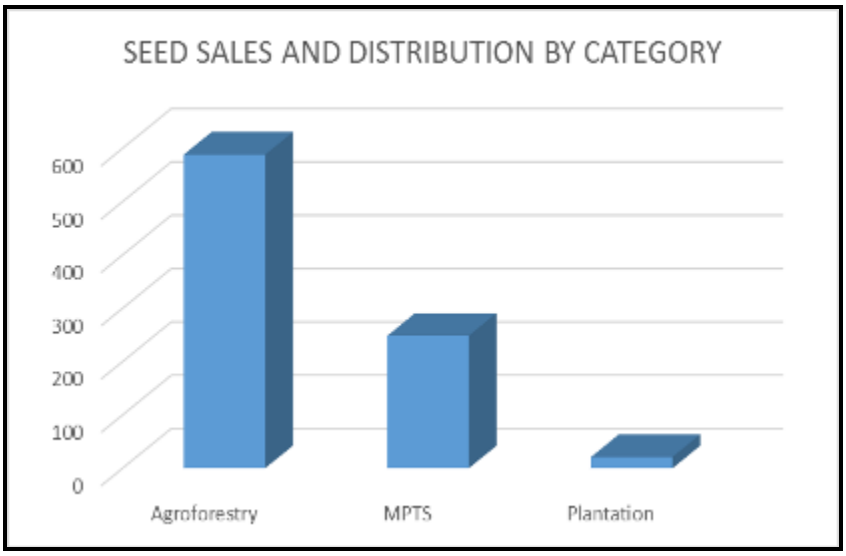


**Figure 3: Quantities (kgs) of seed sold and distributed by category between July, 2013-June, 2014**

### 2.2.3 Seed Quality and Germination Tests

Routine seed tests were conducted on 25 seed batches in the laboratory for seeds that were being stored. Acceptable germination was observed on 23 seedlots. Seeds which have been stored for a very long time, eg *Z. maurutiana* (stored since 1985 and *T. Sericea* had very low levels of germination and are recommended for boarding-off.

**Figure 4 and 5: Seed quality testing of stored species in the laboratory**

### 2.2.4 Challenges

i) **Lack of seed sources:** Demand for plantation species is increasing, but there is a general lack of seed sources especially for fast growing pine species that are known to yield a rapid increase in volume in a shorter period of time. Above all, reliable seed sources are aging and are now producing smaller quantities than before.

ii) **Vandalism of seed sources.** Besides, the remaining viable seed sources are under pressure of vandalism especially in Dedza-Chongoni and Mua-Mtakataka by surrounding communities.

iii) **Untimely funding:** Untimely funding for seed operations delayed acquisition of seeds especially plantation species. However, the set targets were achieved after the sowing time had passed.

iv) **Seed testing laboratory**: Lack of basic resources such as blotting papers for small seed germination (especially in 2013) were difficult to be conducted as the materials were not easily accessible. However for now, the materials are in stock though in insufficient quantities.

### 2.3 Tree Improvement and Seed Sources

FRIM carried out the following activities;

i) Raised 250 ramets of *P. tecunumanii* and planted one hectare of clonal seed orchard at Zomba Mountain Outerslopes.
ii) Selected 50 plus-trees in a *P. tecunumanii* trial on Zomba Plateau which will be used as scion donor trees.
iii) Supplied ten thousand (10,000) seedlings of improved *P. ocoorpa* to Zomba Mountain Timber Planatation for planting and beating up.

### 2.4 The Millennium Seed Bank Project (The Useful Plants Project)

#### 2.4.1 Developing and Strengthening Partnerships

Mulanje Mountain Conservation Trust (MMCT) and Lake Chilwa Climate Change Adaptation Project (LCBCCAP) are new partners that have actively participated in the implementation of specific outputs/activities of the project. The project linked with community groups within the decentralized structures at district councils. In order to foster continuity and sustainability of the Useful Plants Project activities in the impact areas, District Forestry staff have been the main link to communities in Mulanje and Dowa districts.

### 2.4.2 Community Awareness

In collaboration with the MMCT, the UPP carried out community awareness campaigns to encourage local people's participation in the conservation of wild useful plants near and around Mulanje Mountain. In the reporting year, two community meetings were held to inform and educate communities around the mountain on the need to participate in the useful plant conservation initiatives. These meetings were held in Group Village Headmen (GVH) Nande and Kambenje. Project sign posts were also developed and erected towards the end of the activity in the two districts.


*Mary Jambo (Vice secretary) of Thuchila conservation group explaining to village members on the useful wild plants that the committee is promoting for cultivation during one of the awareness meetings.*

### 2.4.3 *In-Situ* and *Ex-Situ* Conservation of Useful Plant Species

#### 2.4.3.1 Seed collection

Three seed collection exercises targeting endangered, endemic and economically important plant species on the Mulanje Mountain and the slopes of Michesi Mountain were executed in the reporting period. A total of 39 species were collected, processed and are stored at the Malawi National Plant Genetic Resource Centre and Millennium Seed Bank at Kew.

*Dominic Gondwe, Steve Mphamba and Hassam Patel participating in mass collection of Mulanje cedar' Widdringtonia whytei in November, 2013 on Mulanje Mountain***.**

### 2.4.3.2 Germplasm collections by communities

Ten (10) species were collected and raised in the nurseries by the community groups in Dowa and Mulanje districts. The species include; *Syzgium cordatum, Uarpaca kirkiana, Landolphia kirkii, Newtonia buchananii, Aloe chabudii,* and other wild vegetable crops. Local seed collection for both useful vegetables and tree seed are still in progress in the project sites.

### 2.4.3.3 Community training and capacity building

Ninty six (96) community members (37 females and 58 males) participating in the ex-situ and in-situ conservation of useful plants were trained in planning, leadership skills, nursery establishment, record keeping, seed pre-sowing treatments and natural resource management in general. The skills offered were meant to enhance the understanding of forest-resource-based-enterprises in the community groups that are aimed at improving their livelihood while conserving the targeted useful plants.

*Monekera conservation group training sessions in Nessa village Mulanje District and the Malawi College of Forestry facilitator at Kasalika village presenting to the herbalist group in Dowa District.*

### 2.4.3.4 Tree planting and Management of the useful wild plants

A total of 25,142 seedlings were planted in all the impact villages with a survival rate of 84% in the 2013/2014 planting season. Ifrntification os species was carried out by the community groups themselves. Most of these species have never been planted anywhere else in the country before.

Monekera Conservation club in Mnessa village in Mulanje district hosted the launch of the Mulanje District tree planting season in March 2014. This function was attended by the Honourable Minister of Environment and Climate Change, Honorable Mrs. Halima Daudi (MP), and other departmental heads. Mulanje Cedar (*Widdringtonia whytei,* Rendle) was symbolically planted in this area to signify its importance as a national and endemic tree species that is critically endangered.

Former Hon. Minister. Halima Daudi (MP.) planting *Widdringtonia whytei* seedling with assistance from the Monokera Conservation Chair Ms. Asima Nikisi during the district tree planting launch in Nessa village on March 15th 2014.

During the same period, 870 pupils from three schools at all class levels participated in planting and other activities of the project. As part of environmental education and awareness campaign, pupils were involved in tree planting activity in Zomba District. The activity was organized jointly by the Useful Plants Project and Lake Chilwa Basin Climate Change Adaptation Programme-a partner in environmental education and awareness.

Pupils from four schools planting tree seedlings on Zomba Mountain supported by the Useful Plants Project in January, 2014

### 2.3.4.5 Domestication of wild vegetables

There is an increase in the number of wild vegetable species being cultivated by communities from 6 last year to 14. Some of the species being cultivated in Mulanje are reported to have low population densities in their natural habitats, possibly due to high utilization pressure from the communities and prevailing adverse weather conditions. Twenty seven (27) farming households in Mulanje district were observed cultivating wild vegetables while three (3) in Dowa district.

## 3.0 TREES ON FARM STRATEGY AREA

**Henry Utila, Willy Sagona, Herbert Jenya and Aida Mkwezalamba**

### 3.1 Background

The purpose of the Trees on Farm (TOF) Strategy Area is to optimize productivity and sustainability of smallholder farming systems by (a) developing appropriate technologies for propagation, establishment and regeneration of trees on farms, (b) identifying and evaluating suitable woody species for incorporating into farming systems, (c) generating tree management techniques on farm and assessing productivity of such systems; and (d) providing a pest and disease control and monitoring service.

The outputs of this strategy are expected to be information and technologies on propagation of tree species; establishment methods; identification of species for various agro-ecological zones and /or farming systems; tree management and productivity in various farming systems and protection measures against insect pests and disease infections.

During the reporting period, the Strategy Area (SA) facilitated training for farmers in the management of tree seeds. The SA also continued to facilitate the uptake and scaling up of Conservation Agriculture (CA) technologies in the Lake Chilwa Basin, as a way of improving the people's economies and reducing their dependence on natural resources for their livelihoods.

### 3.2 A study on efficiency of firewood efficient improved cook stoves (ICS)

The activity was carried out with support from the Lake Chilwa Basin Project in Machinga, Phalombe and Zomba districts. A report has been prepared and submitted to the Project Office. The study recommends that the initiative be scaled up so that it assists in reducing the threat to forests posed due to high demand for wood in the basin.

### 3.3 The promotion, distribution/installation of fuel-efficient cook stoves

This activity was carried out in Chiradzulu, Machinga, Phalombe and Zomba districts. The disseminated improved cook stoves to replace the prevailing inefficient three-stone fires or traditional pot support with stoves that combust firewood fuels more efficiently and improve thermal transfer to pots thereby saving trees and forests and lowering greenhouse gas emissions.

A total of 2198 cook stoves were distributed in Machinga (Nambwinda Community) and Zomba (Malosa). There is high demand for the wood saving technology by the communities in the three districts. It was suggested that a survey be conducted to compare the current fuel wood consumption after the intervention.

### 3.3 Management and phenology studies in domesticated indigenous fruit trees

The major activity durint the reporting period was to carry out weeding and screefing of the GEnebank plots in Machinga and Mangochi to ensure that the trees are protected from fires and weed encroachment. This activity was carried out in an area covering 3.7 hectares *(Sclerocarya birrea*) and 2.5 hectares (*Uapaca kirkiana*) . Work in both sites was done using contract labour

Most of the *Uapaca kirkiana* and *Sclerocarya birrea* trees in the genebank are growing well, but with a few are regenerating as coppices and suffretex and some are are missing from the plots. Cankers and some diebacks have been observed and a number of while trees have been infested with termites and stem boring insects. A detailed report on the status and health of trees has been prepared.

It has been observed that *Sclerocarya birrea* has a great variability among 22 provenances in fruit productivity. Sixteen (16) provenances (73%) were fruiting during the perioduring the. The most outstanding fruit provenance (795±208 fruits) was Marracuene provenance (MZ) from Mozambique. Superior fruiting results were also attained in Kalimbeza provenance (489±269 fruits) from Namibia (N3), Chikhwawa provenance (498±108 fruits) from Malawi (ML1) and Moamba provenance (462±106 fruits) from Mozambique (MZ3). The lowest fruit provenances were Missira provenance from Mali (M1), Oshikondilongo provenance from Namibia (N1) and Muzarabani provenance from Zimbabwe (Z4) with mean fruit number ranging from 83±18 to 144±30 fruits.

**Table 6: Performance of different *Uapaca kirkiana* provenances**

| Provenance | Total trees | Trees with Female Flowers | Female Flowers % | Trees with Male Flowers | Male Flowers % | Total % (male and female flowers) |
|---|---|---|---|---|---|---|
| Dedza | 324 | 8 | 2 | 17 | 5 | 8 |
| Kasungu | 84 | 1 | 1 | 7 | 8 | 10 |
| Litende | 72 | 2 | 3 | 2 | 3 | 6 |
| Luwawa | 228 | 8 | 4 | 20 | 9 | 12 |
| Mozambique | 48 | 1 | 2 | 5 | 10 | 13 |
| Phalombe | 288 | 10 | 3 | 10 | 3 | 7 |
| Thazima | 156 | 5 | 3 | 6 | 4 | 7 |

### 3.4 Facilitating Conservation Agriculture in the Lake Chilwa Basin

FRIM has been facilitating implementation of Conservation Agriculture among communities especially those who are also involved in forestry activities in the Lake Chilwa Basin. This is being achieved by conducting conservation agriculture demonstrations and facilitating the uptake and scaling up of the technology and through provision os technical support. In the 2013/2014 season 128 demonstrations have been maintained with participating 136 farmers on 23.7ha. A total of 1,055 new farmers were recruited and supported with fertilizer and these farmers were

required to contribute hybrid seed suitable for their agro-ecological zone bringing a new area under conservation agriculture of 168.6ha. In 2013/2014 season a total area of 192.3ha was under CA practice with participation of 1,175 farmers.

**Table 7: Total inputs which were distributed, number of farmers and hectares per EPA for demonstrations and up scaling CA**

| Sn | District | EPA | No of farmers | Area ha | NPK No of 50kg bags | UREA No of 50kg bags | Maize Seed kg |
|---|---|---|---|---|---|---|---|
| 1 | Zomba | Ngwelero | 192 | 28 | 56 | 84 | 100 |
| 2 | | Malosa | 90 | 15 | 30 | 45 | 125 |
| | | **Sub total** | **282** | **43** | **86** | **129** | **225** |
| 3 | Machinga | Nsanama | 172 | 24 | 48 | 72 | 100 |
| 4 | | Nanyumbu | 150 | 27 | 54 | 81 | 0 |
| 5 | | Domasi | 158 | 21.3 | 47 | 70 | 50 |
| | | **Sub total** | **480** | **72.3** | **149** | **223** | **150** |
| 6 | Phalombe | Mpinda | 68 | 10.94 | 22 | 33 | 0 |
| 7 | | Waruma | 46 | 12.02 | 25 | 37 | 38 |
| 8 | | Tamani | 105 | 15.15 | 31 | 46 | 80 |
| 9 | | Naminjiwa | 70 | 18 | 36 | 54 | 75 |
| 10 | | Kasongo | 120 | 20.38 | 41 | 62 | 50 |
| | | **Sub total** | **409** | **76.49** | **155** | **232** | **243** |
| 11 | | Chanco demonstration (members) | 4 | 0.5 | 1 | 1 | 20 |
| | | **Sub total** | **4** | **0.5** | **1** | **1** | **20** |
| | | **Grand total** | **1175** | **192.3** | **391** | **585** | **638** |

### 3.4.1 Conservation Agricultutre field days in the Lake Chilwa basin

FRIM through Lake Chilwa Basin Climate Change Adaptation Programme (LCBCCAP) in fulfilling its role to facilitate implementation of Conservation Agriculture work in collaboration with the Department of Land Resources. The programme continues to exploit ways and means of increasing CA with Agroforestry adoption across the Lake Chilwa Basin through technical and financial support. One of the ways to promote CA with Agroforestry adoption has been through field days which are conducted in the impact Extension Planning Areas (EPAs) within the LCBCCAP hotspots. Through these field days farmers are able to share knowledge and skills; technology impact is appreciated; and brings about community cohesion through the interactions that the field days offer. Thus, out of the 10 EPAs which are targeted by the programme across the basin, the LCBCCAP supported 9 EPAs to conduct field days to showcase the CA benefits and provide a platform on which farmers and extension workers shared other emerging lessons from CA with Agroforestry practice. The field days were attended by 1142 persons across the basin districts of Zomba, Machinga and Phalombe.

### 3.5 Domestication of Indigenous fruit trees in the Lake Chilwa Basin

Members of Village Natural Resources Management Committees and Forestry groups in Nambwinda (Machinga), Mpaniha (Phalombe) and Mpyupyu (Zomba) have been trained on the needed skills in raising three indigenous fruit tree species, viz: *Uapaca kirkiana*, *Parkia filicoidea* and *Syzygium cordatum*. 3500 seedlings of the mentioned species have been raised in the nursery. These seedlings are expected to be planted out in the next planting season within their village forest areas as blocks for demonstration. It is expected that successful establishment of these species will remove the perception that IFTs cannot be domesticated.

## 4.0 PLANTATIONS STRATEGY AREA

**Michael Chirwa, Erick Mbingwani, Robert Mzumara, Dave Moyo and Ustanzious Nthenda**

### 4.1 Background

The purpose of the Plantations Research Strategy Area is "to optimize productivity of timber and fuel wood plantations by identifying and improving suitable technologies for propagation, management and protection". The outputs are expected to be information and technologies relating to species, provenances and tree improvement; nursery techniques, establishment and regeneration; tree and stand management, growth and yield; protection; products and utilization of plantation trees and silvicultural management systems for plantation trees.

### 4.2 Assessment of standing wood stock in Government's major timber plantations

Forest inventories were carried out in Dzalanyama, Dedza-Chongoni, Dzonzi-Mvai, Mazamba and Luwawa on the Viphya, Jembya, and Zomba timber plantations from August to October, 2013 to estimate standing wood volumes of mature pine stands in order to determine annual allowable cuts for subsequent years.

The results showed that there was only 1,789,273.16 $m^3$ of mature standing wood covering an estimated area of 4,779.77 hectares. Findings of the assessment reveal that the age gap between the current mature stock and the oldest immature stocks is very wide as many as 20 years in some plantations. Based on this age gap, the nation would face acute timber scarcity for approximately fifteen (15) consecutive years. It was recommended that, to avert the possible acute timber shortage, there was a need to adopt a rational harvesting regime that would stagger the allowable cut across the gap years. At the same time reforestation with appropriate species and sound protection measures of the growing stock from various vices should be enhanced. Table 7 shows the details of individual plantation's findings.

**Table 8. Standing Volume and Allowable in the Assessed Plantations**

| Plantation | Available wood | | Allowable cut | | Lasting period (years) |
|---|---|---|---|---|---|
| | Volume ($m^3$) | Area (Ha) | Volume ($m^3$) | Area (Ha) | |
| **Chongoni** | 32,322.36 | 139.09 | 6,464.47 | 27.82 | 5 |
| **Dedza** | 42,797.39 | 152.71 | 7,132.90 | 25.45 | 6 |
| **Dzalanyama** | 24,269.78 | 60.46 | 2,022.48 | 5.04 | 12 |
| **Dzonzi-Mvai** | 45,785.54 | 133.85 | 15,261.85 | 44.65 | 3 |
| **Luwawa** | 561,802.38 | 1,208.10 | 37,453.49 | 80.54 | 15 |
| **Mazamba** | 894,347.90 | 2,712.60 | 59,623.19 | 180.84 | 15 |
| **Zomba** | 187,947.81 | 372.96 | 23,493.48 | 46.6 | 8 |
| **Jembya** | 16,909.03 | 28.75 | | | |
| **Total** | 1,789,273.16 | 4779.77 | - | - | - |

## 4.4 New Eucalyptus Pests

### 4.4.1 Verification of eucalyptus *gall wasp (Leptocybe invansa)*

As an introduced species in Malawi, *eucalyptus species* has been attacked by both indigenous and introduced pests such as termites, phoracantha beetles and *eucalyptus* snout beetles. Of late, new pests have surfaced resulting in reduced tree growth and sometimes in death of the trees. These are the bronze bug (*Thaumastocoris peregrines)* and *eucalyptus* gall wasp (*Leptocybe invansa)*. These pests have only recently been reported in Malawi.

A survey was conducted to establish the extent of spread of the pest in Mulanje, Phalombe and Zomba districts. The survey showed that *Leptocyba invansa* is fast spreading in the sampled districts. In Mulanje and Phalombe, the most infested species was *E. glandis* while in Zomba, the most infested was *E. camaldulensis*. There is a need to continue with the exercise in the other remaining districts to ascertain how far the pest has spread and also to establish trials to back up the information generated during the survey. Further studies need to be conducted across the ages, coppice, and species over time.

The low severity of infestation on *E. tereticornis* and variation of infestation levels across same species is an indication that there might be differences in species tolerance and resistance to the pest. There is need to continue with monitoring on these variations and to conduct seedling resistance studies.

### 4.4.2 A workshop on Eucalyptus pest (*Leptocyba invansa*)

The workshop was organized to raise awareness to all stakeholders on this serious outbreak of the Eucalyptus pest. The participants invited were Tea estates (Mulanje and Thyolo districts), Total Land Care Malawi, Forestry Department Headquarters, Alliance One Malawi Ltd, District Forestry Offices and Citrifine. Members to the meeting were advised to report any presence of the pest to FRIM and share the information with other stakeholders engaged in growing Eucalyptus tree species. It has now been reported by Tea Estates from Mulanje, Alliance One Malawi Limited and RAIPLY that the pest has already affected some of their Eucalyptus stands.

To increase public awareness of the pest outbreak, leaflets and newspaper articles published in addition to announcements on the Chancellor College Community radio..

The following recommendations were made at the workshop:

- Pest monitoring schemes need to be introduced;
- Restricting movement of eucalyptus seedlings and products;
- Destruction of infected plants through burning and burying;
- Intensify studies on natural resistance and control;
- Use of chemical control but at a smaller scale to avoid pollution;
- Public awareness;
- Creation and strengthening of networks for timely sharing of information on pest outbreaks and possible control options locally, regionally and globally.

## 4.5 SADC-GIZ MRV Project: Development of Monitoring Systems for REDD+ for SADC

The Development of Integrated Monitoring Systems for REDD+ in the SADC Region project pursues the objective of (1) developing and putting into practice integrated monitoring systems for the development of forest areas, carbon stocks and emissions from deforestation and forest degradation, and (2) integrating this (1 above) into an approach supported by all SADC member countries and Malawi is one of the pilot countries. The key measure of this project is to achieve high accuracy in the calculation of emissions with a special combination of innovative remote sensing technology and terrestrial surveys of corresponding emission factors. In these and other important areas the aim is that the technical, institutional and human resource capacities in selected countries should be strengthened (capacity development).

This project will contribute to enabling the SADC countries and the region to make the technical and institutional preparations for participating in a REDD+ mechanism and in the medium term receiving compensation payments for reducing emissions, and/or preserving and extending carbon sinks in tropical and subtropical forests. If appropriately transparent distribution mechanisms are available, these compensation payments can improve the livelihoods of indigenous and local population groups. The following activities were carried out under the project.

a) Terrestrial inventories were conducted in the Trans boundary test site shared by Malawi and Zambia in Kasungu National Park. This activity was completed on the Malawi side. Data analysis and report writing are to be conducted upon completion of the data collection exercise in Zambia.
b) Staff from the Forestry Department also attended a **planning meeting** in Botswana, from 12th to 14th February 2014 at which work plans for 2014 were developed. One observation by SADC is that **Malawi was yet to write a letter of commitment** despite that we are informally committed to the project through the engagement of Forestry Department staff and provision of some material resources.
c) **Training in remote sensing and terrestrial inventories** were also conducted for staff engaged in the project and other programmes such as Forest Preservation Programme.

## 4.6 Rehabilitation of Changalume Old mine project

The Forestry Research Institute of Malawi, in partnership with National Herbarium and Botanic Gardens of Malawi and World Vision (Zomba Cluster), signed a contractual agreement with Lafarge Cement Malawi Ltd in March 2012 to re-vegetate and rehabilitate the old Changalume Limestone Mine which was abandoned in 2002 after investigations revealed that commercial limestone deposits had dwindled to warrant excavations. The main objective is to rehabilitate and/or restore the degraded land. Specifically the objectives were to (1) re-vegetate the quarry floor and slopes and the surroundings with appropriate plant species and (2) develop conservation management plan of the site.

The project has achieved quite a lot in the greening phase, that is, planting and land preparation. Overall, the quarry area has been wholly re-vegetated remaining with the kiln and clinker

loading areas. Beating-up was done in January 2014 while watering to avoid further loss of plants to dryness was done from June to November 2013. A total area of 19.8 hectares (based on spacing used such as 2m apart planted 1.9 hectares while 1m apart planted 17.9 hectares) and a total of 169,800 seedlings have been planted. Tree species to be planted were determined through a species survey of the area and soils characterization to determine the best plants that can survive in conditions that are prevalent at Changalume, i.e. shallow and basic soils. In all cases soil substrate has been imported to the site from other places around Namadidi to provide top soil for initial plant development and establishment. Land-scaping was also done in areas where the terrain wasn't favourable for plant growth, especially on the steep slopes.

The Environmental Affairs Department visited the site in April 2014 and approved that the works were done according to expectation and recommended that it was best practice ever done in the country.

## 5.0 INDIGENOUS WOODLAND MANAGEMENT STRATEGY AREA

**Gerald Meke, Vincent Chithila, Gloria Makhambera, Tembo Chanyenga and Erick Mbingwani**

### 5.1 Background

The purpose of the IWM Strategy Area is to secure sustainable management of Malawi's indigenous woodlands in order to meet the present and future needs of ordinary rural people and to halt deforestation. Malawi is mostly covered by Miombo woodlands, which are poor in commercial timber species but provide many non-timber forest products (NTFP) and intangible benefits which underpin rural life in addition to providing variable service functions. Increased land pressure has resulted in extensive clearing and severe degradation of the miombo woodlands and repeated late burning has compounded the problem

The outputs of the IWM Strategy Area are expected to be information and technologies on productivity of wood and non-wood products of indigenous woodlands, ecology, regeneration and establishment, management regimes and protection from fire and pests.

### 5.2 Inventory of *Jateorhiza palmata* (Columba root) in Matandwe Forest Reserve

The Forestry Research Institute of Malawi was sanctioned by the Improved Forest Management for Sustainable Livelihoods to assess the availability and sustainability of *Jateorhiza palmata* in Matandwe Forest Reserve in Nsanje district. An inventory was carried out in the Forest Reserve. Estimated stocking of *J. palmata* was 16 ± 4 stems $Ha.^{-1}$. The figures show that if the resource harvesting is not regulated the species may be wiped out of the reserve and this calls for urgent. The inventory report has been produced as 'FRIM Report' and is currently on circulation.

### 5.4 Workshop on Co – management of Forest Resources

Co-management as a concept in natural resources management was introduced in Malawi in the late 1990s in management of forest reserves, wildlife in game reserves and national parks and in lake fisheries. The concept was introduced as a novel way of managing natural resources on public land with rural communities.

This workshop was convened by Forest Research Institute of Malawi at Annies Lodge in Zomba from the 18th to the 20th November 2013. The objective of the workshop was to provide an opportunity for researchers and practitioners in natural resources co-management field to interact and share experience with forestry personnel and map out a way forward.

The workshop unravelled that co-management can be the best way to conserve and manage Malawi's natural resources if well implemented. Effective data collection mechanisms should be put in place so that co-management can be objectively evaluated. Efforts should be made to ensure that delivery on livelihood benefits is improved while ensuring that the objectives of setting aside conservation areas are not negatively affected. Stakeholders need to invest more

time and resources in capacity building of facilitators and the local communities, providing guidance, supervising activities and exploring various livelihood options and benefits.

The proceedings of the workshop have been produced. The copies of these proceedings will have to be printed, bound and distributed to presenters and various stakeholders using Forest Development Funds.

### 5.5 Installation of Beehives in various Village Forest Areas (VFAs) in the Lake Chilwa Basin

In the course of sustainable management and utilization of the trees in these VFAs, the local communities have been given the Beehives so that they are able to generate some income from the VFAs through selling of honey. These have been supplied to local communities in Ntaja area under the Lake Chilwa Basin Project. In total eighteen beehives were installed in Nsakaru (7), Namasimba (7) and Nambwinda (4) Village Forest Areas (VFAs).

### 5.6 Inventory of Vinthukutu Forest Reserve

The Improved Forest Management for Sustainable Livelihoods Programme (IFMSLP) funded Forestry Research Institute of Malawi (FRIM) to conduct an inventory of Vinthukutu Forest Reserve in Karonga district. Vinthukutu Forest Reserve is under the management of the District Forestry Office in Karonga. Local communities living close to this reserve have been organized to manage the forest reserve under the supervision of forestry officers.

FRIM carried out an inventory of the reserve, to measure the stocking densities and determine if the local communities are doing the right thing in the course of managing and utilizing the forest reserve. Thirty different tree species were recorded in the tree inventory. The most dominant species were *Brachystegia floribunda, B. speciformis, Pseudolachstylis maprounefolia, B. boehmii* and *Bobgunia madagascariensis* (Appendix 4). The trees had mean diameter at breast height of 42.04 (±10.5) and a mean height of 17.61 (±5.01).

### Compilation of Compendium of Invasive Species in Malawi

The Strategy Area is also compiling a compendium of invasive tree species in Malawi, the first of its kind, which will be made available in due course. The list is now in its final stage for FRIM scientists to review it.

## 5.0 ADMINISTRATION AND OTHER CROSS-CUTTING ACTIVITIES
**Clement Z. Chilima, Constance Khozombwe, Cliff Chimkwita and W. Chome**

### 5.1 Collaboration and Support to Training Institutions

FRIM supported seventeen (17) students from different colleges for attachments/ practical research. These included the Malawi college of Forestry and Wildlife (1), Natural Resources College (12), Bunda College of Agriculture (2) and Mzuzu University (2).

### 5.2 Personnel Matters

#### 5.2.1 Staffing Levels

FRIM continued to operate with inadequate staffing. During the reporting period, out of 109 established posts only 73 were filled. This has mostly been due to deaths and retirements.

Almost all the technical fields of research at FRIM are lacking experienced and adequately trained personnel e.g. Pathology, Soil Science, Seed Technology, Tree Breeding, Mensuration, Wood Science, Social Forestry and Entomology.

#### 5.2.2 Training

A number of members of staff at FRIM are undergoing graduate and post-graduate training in various institutions as follows:

- Mr. Gerald Meke: PhD programme in Conservation Biology at Chancellor College funded by Lake Chilwa Climate Change Adaptation Programme (LCCCAP);
- Mr. Henry Utila: MSc. Environmental Sciences at Chancellor College sponsored by LCCCAP;
- Mr. Vincent C. Chithila: MSc. Environmental Sciences at Chancellor College sponsored by UNDP- completed, awaiting submission of thesis;
- Mr. Michael Likoswe: MSc. Environmental Sciences at chancellor College sponsored by Malawi Environmental Endowment Trust- in progress;
- Mr. Willy Sagona: MSc. Environmental Sciences at chancellor College-in progress, sponsored by LCCCAP.
- Mr. Erick Mbingwani: MSc. Environmental Sciences at Rhodes University-in progress, sponsored by ASSETS Project.
- Miss Gloria Makhambera: MSc in Soil Science at Lilongwe University of Agriculture and Natural Resources sponsored by AGRA-completed, awaiting submission of thesis

- Mr. Herbert Jenya: BSc. Forestry at Mzuzu University- in progress, self sponsored;
- Mr. Owen Kachala: BSc. Forestry at Mzuzu University- in progress, self sponsored;
- Ms. Ida Mkwezalamba: BSc. Forestry at Mzuzu University- in progress, self sponsored; and
- Mr. Ustanzious Martin Nthenda: Bachelor of Social Sciences at Blantyre International University – in progress, self sponsored.

### 5.2.3 Retirements

Some members namely: James Tambula, Humphrey Chapama, Kinros Likunda, have reached their mandatory retirement age and their benefits are being processed.

### 5.2.4 Leave Grants

Leave grants were paid to all members of staff during the financial year.

### 5.2.5 Promotions

The institute applied for the industrial class employees to be considered for promotions to subordinate class but has since not received any response.

## 5.3 Internet

The internet service has greatly improved after installing and configuring the new Data Transmission Unit (DTU) from MTL. The acute shortage of computers in the institute continued during the reporting period.

## 5.4 Library

The library did not receive or sale any books during the reporting period. Most visitors to the library were students. There is need for a Librarian or training of the current lady assistant who is manning the library.

## 5.5 Financial Matters

### 5.5.1 Revenue Collection and ORT Monthly funding

The Institute collected revenue amounting to MK 5,503,929.64 from the sales of seed and issuance of phytosanitory certificates.

The Institute continued to operate with low funding levels with an average monthly funding of MK 364,130.75. This made it difficult to conduct major research activities during the reporting period as these would only mostly used in paying utility Bills. Table 9 shows the details of funding.

Table 9. Monthly ORT funding and Revenue Collection

| | JULY | AUG | SEPT | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUNE | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ORT FUNDING** | **964,487** | **382,244** | **382244** | **405,795** | **811,590** | **202,898** | **202,898** | **300,000** | **202,898** | **202,898** | **202,898** | **108,719** | **3,605,081** |
| **REVENUE COLLECTED** | **749,950** | **523,334** | **829,406** | **516,590** | **1,374,750** | **141,000** | **206,400** | **124,600** | **212,650** | **242,000** | **142,700** | **440,550** | **5,503,929** |

## 5.6 Equipment, Vehicles and Infrastructure

### 5.6.1 Transport section

**MOTOR VEHICLES**

| VEHICLE REG. NUMBER | TYPE | CONDITION |
|---|---|---|
| 047 MG 065 | Mitsubishi -Lorry | Non- Runner |
| CK 3359 | Pajero (Lafarge Project) | Runner |
| MG 846AF | Nissan Twin Cab | Runner |
| MG 865 AF | Nissan Patrol | Runner |
| MG 848 AF | Nissan Single Cab | Runner |
| MG 907 AF | Lorry | Runner |
| 72 SC 11 | Isuzu (Project-NCST) | Runner |
| 047 MG 529 | Toyota Camry | Non-runner |
| MG 638 AB | Nissan Hardbody | Runner |
| BL 7139 | Hilux Twincab (Millenium Project) | Non-Runner |
| BL 1702 | Hilux Twincab (Millenium Project) | Non-runner |
| BP 2408 | Mitsubishi Twincab (Lafarge Project) | Runner |
| MG 650 AE | Tractor (LCBCCAP) | Runner |

**MOTORCYCLES**

| Item | | Condition |
|---|---|---|
| i) | MZ 4433 Yamaha 175 | Runner |
| ii) | BM 2559 Yamaha 175 | Runner |
| iii) | MJ 5559 Yamaha 125 | Runner |
| iv) | MG 838 T Yamaha AG 100 | Runnner( LCBCCAP) |
| v) | MHG 3031 Yamaha 125 | Runner (LCBCCAP) |
| vi) | PE 2086 Yamaha 125 | Runner (LCBCCAP). |

## APPENDICES

**Appendix 1. Tree seed quantities collected/collected**

| Month | Species name | Qty. (Kg) | Amount (Mk) | Germination /Kg | Expected No. of seedlings |
|---|---|---|---|---|---|
| **July** | *S. siamea* | 1 | 1,100 | 17,200 | 17200 |
| **2013** | *B. nyasica* | 0.05 | 375 | 798,500 | 39925 |
| | *T. ivorensis* | 0.5 | 425 | 6200 | 3100 |
| | *S. siamea* | 0.5 | 550 | 17,200 | 8600 |
| | *P. kesiya* | 0.5 | 7,500 | 49,400 | 24700 |
| | *E. camadulensis* | 0.04 | 600 | 686,600 | 27464 |
| | *E. Maidenii* | 0.2 | 3,000 | 251,000 | 50200 |
| | *G. sepium* | 1 | 1,800 | 6,100 | 6100 |
| | *F. albida* | 1 | 1,000 | 5,700 | 5700 |
| | *E. Maidenii* | 0.5 | 7,500 | 251,300 | 125650 |
| | *G. sepium* | 3 | 5,400 | 6,100 | 18300 |
| | *E. Maidenii* | 1 | 15,000 | 251,300 | 251300 |
| | *P. kesiya* | 0.3 | 4,500 | 49,400 | 14820 |
| **Sub - total** | | **9.59** | **48,750** | | **593059** |
| **August** | *T. ciliata* | 0.2 | 3,000 | 251,600 | 50320 |
| **2013** | *G. sepium* | 10 | 18,000 | 6,100 | 61000 |
| | *F. albida* | 10 | 10,000 | 5,700 | 57000 |
| | *Z. mauritiana* | 10 | 10,000 | 1,900 | 19000 |
| | *L. leucocephala* | 4 | 4,000 | 12,600 | 50400 |
| | *T. vogellii* | 5 | 4,000 | 14,600 | 73000 |
| | *A. lebbeck* | 5 | 7,500 | 6,200 | 31000 |
| | *P. kesiya* | 3 | 45,000 | 49,400 | 148200 |
| | *P. kesiya* | 0.05 | 750 | 49,400 | 2470 |
| | *A. quanzensis* | 0.5 | 500 | 350 | 175 |
| | *G. sepium* | 0.5 | 900 | 6,100 | 3050 |
| | *F. albida* | 0.5 | 500 | 5,700 | 2850 |
| | *A. polyacantha* | 0.5 | 500 | 9,000 | 4500 |
| | *F. albida* | 1 | 1,000 | 5,700 | 5700 |
| | *G. sepium* | 0.5 | 900 | 6,100 | 3050 |
| | *A. lebbeck* | 0.5 | 500 | 6,200 | 3100 |
| | *A. polyacantha* | 1 | 1,000 | 9,000 | 9000 |
| | *A. lebbeck* | 1 | 1,500 | 6,200 | 6200 |

| Month | Species name | Qty. (Kg) | Amount (Mk) | Germination /Kg | Expected No. of seedlings |
|---|---|---|---|---|---|
| | *P. kesiya* | 1 | 15,000 | 49,400 | 49400 |
| **Sub - total** | | **54.25** | **124,550** | | **579415** |
| **September** | *L. leucocephala* | 5 | 5,000 | 12,600 | 63000 |
| **2013** | *G. sepium* | 3 | 5,400 | 6,100 | 18300 |
| | *A. quanzensis* | 4 | 4,000 | 350 | 1400 |
| | *A. lebbeck* | 2.5 | 2,500 | 6,200 | 15500 |
| | *B. nyasica* | 0.5 | 7,500 | 798,800 | 399400 |
| | *A. lebbeck* | 30 | 30,000 | 6,200 | 186000 |
| | *G. sepium* | 30 | 54,000 | 6,100 | 183000 |
| | *F. albida* | 30 | 30,000 | 5,700 | 171000 |
| | *S. sesibania* | 5 | 7,500 | 36,600 | 183000 |
| | *S. spectabilis* | 5 | 9,000 | 29,800 | 149000 |
| | *M. oleifera* | 30 | 30,000 | 5,000 | 150000 |
| | *A. lebbeck* | 0.25 | 250 | 6,200 | 1550 |
| | *A.quanzensis* | 0.5 | 500 | 350 | 175 |
| | *A. lebbeck* | 10 | 15,000 | 6,200 | 62000 |
| | *F. albida* | 10 | 10,000 | 5,700 | 57000 |
| | *S. siamea* | 5 | 10,000 | 17,000 | 85000 |
| | *K. anthotheca* | 15 | 15,000 | 2,300 | 34500 |
| | *A. adiathifolia* | 30 | 30,000 | 5,700 | 171000 |
| | *G. sepium* | 10 | 18,000 | 6,100 | 61000 |
| | *E. maidenii* | 1 | 15,000 | 251,300 | 251300 |
| | *S. siamea* | 5 | 10,000 | 17,200 | 86000 |
| | *F. albida* | 5 | 5,000 | 5,700 | 28500 |
| | *A. lebbeck* | 10 | 15,000 | 6,200 | 62000 |
| | *K. anthotheca* | 10 | 10,000 | 2,300 | 23000 |
| | *F. albida* | 1 | 1,000 | 5,700 | 5700 |
| | *A. lebbeck* | 1 | 1,000 | 6,200 | 6200 |
| | *B. nyasica* | 0.67 | 1,000 | 798,800 | 535196 |
| | *P. kesiya* | 0.5 | 7,500 | 49,400 | 24700 |
| | *F. albida* | 2 | 2,000 | 5,700 | 11400 |
| | *M. oleifera* | 5 | 5,000 | 5,000 | 25000 |
| | *A. quanzensis* | 10 | 10,000 | 350 | 3500 |
| | *G. sepium* | 4 | 7,200 | 6,100 | 24400 |

| Month | Species name | Qty. (Kg) | Amount (Mk) | Germination /Kg | Expected No. of seedlings |
|---|---|---|---|---|---|
| | *A. quanzensis* | 5 | 5,000 | 350 | 1750 |
| | *A.polyacantha* | 3 | 3,000 | 9,000 | 27000 |
| | *L. leucocephala* | 1 | 1,000 | 12,600 | 12600 |
| | *F. albida* | 1 | 1,000 | 5,700 | 5700 |
| | *A. lebbeck* | 5 | 5,000 | 6,200 | 31000 |
| | *F. albida* | 5 | 5,000 | 5,700 | 28500 |
| | *A. quanzensis* | 10 | 10,000 | 350 | 3500 |
| | *A. lebbeck* | 6 | 6,000 | 6,200 | 37200 |
| | *A. polyacantha* | 2 | 2,000 | 9,000 | 18000 |
| | *F. albida* | 3 | 3,000 | 5,700 | 17100 |
| | *M. azederach* | 5 | 5,000 | 2,200 | 11000 |
| | *T. vogellii* | 2 | 2,000 | 14,600 | 29200 |
| | *M. oleifera* | 1 | 1,000 | 5,000 | 5000 |
| | *G. sepium* | 2 | 3,600 | 6,100 | 12200 |
| | *A. polyacantha* | 1.4 | 1,400 | 9,000 | 12600 |
| | *Z. mauritiana* | 1 | 1,000 | 1,900 | 1900 |
| | *F. albida* | 5 | 5,000 | 5,700 | 28500 |
| | *T. vogellii* | 5 | 5,000 | 14,600 | 73000 |
| | *S. siamea* | 5 | 9,000 | 17,200 | 86000 |
| **Sub - total** | | **349.32** | **447,350** | | **3520471** |
| **October** | *A. lebbeck* | 1 | 1,000 | 6,200 | 6200 |
| **2013** | *S. siamea* | 1 | 1,800 | 17,200 | 17200 |
| | *A. quanzensis* | 2 | 2,000 | 350 | 700 |
| | *F. albida* | 2 | 2,000 | 5,700 | 11400 |
| | *P. kesiya* | 1.5 | 22,500 | 49,400 | 74100 |
| | *C. lustanica* | 1.5 | 15,000 | 52,000 | 78000 |
| | *M. azederach* | 0.2 | 200 | 2,200 | 440 |
| | *S. siamea* | 0.05 | 90 | 17,200 | 860 |
| | *F. albida* | 0.1 | 100 | 5,700 | 570 |
| | *F. albida* | 0.5 | 500 | 5,700 | 2850 |
| | *G. sepium* | 0.5 | 900 | 6,100 | 3050 |
| | *A. quanzensis* | 2 | 2,000 | 350 | 700 |
| | *A. lebbeck* | 0.5 | 500 | 6,200 | 3100 |
| | *M. oleifera* | 2 | 2,000 | 5,000 | 10000 |

| Month | Species name | Qty. (Kg) | Amount (Mk) | Germination /Kg | Expected No. of seedlings |
|---|---|---|---|---|---|
| | *S. sesiban* | 2 | 3,000 | 36,600 | 73200 |
| | *A. polyacantha* | 2 | 2,000 | 9,000 | 18000 |
| | *K. anthotheca* | 1 | 1,500 | 2,300 | 2300 |
| | *F. albida* | 3 | 3,000 | 5,700 | 17100 |
| | *A. lebbeck* | 2 | 2,000 | 6,200 | 12400 |
| | *C. mopane* | 1 | 500 | 3,400 | 3400 |
| | *A. quanzensis* | 1 | 1,000 | 350 | 350 |
| | *M. azederach* | 1 | 1,000 | 2,200 | 2200 |
| **Sub - total** | | **27.85** | **64,590** | | **332170** |
| **November** | *A. lebbeck* | 25 | 25,000 | 6,200 | 155000 |
| **2013** | *F. albida* | 20 | 20,000 | 5,700 | 114000 |
| | *E.tereticornis* | 0.2 | 3,000 | 1,063,000 | 212600 |
| | *E. camadulensis* | 0.2 | 3,000 | 460,000 | 92000 |
| | *A. quanzensis* | 4 | 4,000 | 350 | 1400 |
| | *T. vogellii* | 1 | 1,000 | 14,000 | 14000 |
| | *F. albida* | 1 | 1,000 | 5,000 | 5000 |
| | *G. sepium* | 1 | 1,800 | 6,000 | 6000 |
| | *S. sesban* | 1 | 1,500 | 36,000 | 36000 |
| | *L. leucocephala* | 1 | 1,000 | 12,000 | 12000 |
| | *A. polyacantha* | 1 | 1,000 | 9,000 | 9000 |
| | *T. ivorensis* | 1 | 1,500 | 6,200 | 6200 |
| | *A. quanzensis* | 1 | 1,000 | 350 | 350 |
| | *E. grandis* | 1 | 15,000 | 468,500 | 468500 |
| | *F. albida* | 1 | 1,000 | 5,000 | 5000 |
| | *S. siamea* | 3 | 5,400 | 17,000 | 51000 |
| | *A.quanzensis* | 10 | 10,000 | 350 | 3500 |
| | *F. albida* | 2 | 2,000 | 5,000 | 10000 |
| | *K. anthotheca* | 4 | 6,000 | 2,000 | 8000 |
| | *T. sericea* | 4 | 6,000 | 2,000 | 8000 |
| | *C. mopane* | 5 | 2,800 | 3,400 | 17000 |
| | *A. lebbeck* | 5 | 5,000 | 6,000 | 30000 |
| | *A. polyacantha* | 2 | 2,000 | 9,000 | 18000 |
| | *M. oleifera* | 1 | 1,000 | 5,000 | 5000 |
| | *K. anthotheca* | 1 | 1,500 | 2,000 | 2000 |

| Month | Species name | Qty. (Kg) | Amount (Mk) | Germination /Kg | Expected No. of seedlings |
|---|---|---|---|---|---|
| | *F. albida* | 1 | 1,000 | 5,000 | 5000 |
| | *M. oleifera* | 1 | 1,000 | 5,000 | 5000 |
| | *F. albida* | 1 | 1,000 | 5,000 | 5000 |
| | *A. polyacantha* | 1 | 1,000 | 9,000 | 9000 |
| | *S. sesban* | 0.66 | 1,000 | 36,000 | 23760 |
| | *M. oleifera* | 2 | 2,000 | 5,000 | 10000 |
| | *C. bonduc* | 2.2 | 3,300 | 5,000 | 11000 |
| | *S. siamea* | 1 | 1,800 | 17,000 | 17000 |
| | *A.polyacantha* | 1 | 1,000 | 9,000 | 9000 |
| | *G. sepium* | 1 | 1,800 | 6,000 | 6000 |
| | *P. oocarpa* | 0.125 | 1,750 | 45,500 | 5687.5 |
| | *M. azederach* | 0.4 | 400 | 2,000 | 800 |
| | *B. nyasica* | 0.25 | 3,500 | 798,000 | 199500 |
| | *F. albida* | 0.5 | 500 | 5,000 | 2500 |
| **Sub - total** | | **109.54** | **64,800** | | **663550** |
| **December** | *A. lebbeck* | 3 | 3,000 | 6,000 | 18000 |
| **2013** | *K. anthotheca* | 0.66 | 1,000 | 2000 | 1320 |
| | *S. siamea* | 3 | 5,400 | 17240 | 51720 |
| **Sub - total** | | **6.66** | **9,400** | | **71040** |
| **January** | *A. quanzensis* | 7 | 7,000 | 350 | 2450 |
| **2014** | *M. oleifera* | 0.6 | 600 | 5,000 | 3000 |
| **Sub - total** | | **7.6** | **7,600** | | **5450** |
| **Feb. 2014** | *M. oleifera* | 2 | 2,000 | 5,000 | 10000 |
| **Sub - total** | | **2** | **2,000** | | **10000** |
| **March** | *P. taeda* | 2 | 30,000 | 15,500 | 31000 |
| **2014** | *P. kesiya* | 2 | 30,000 | 49,400 | 98800 |
| | *P. oocarpa* | 2 | 30,000 | 45,700 | 91400 |
| | *E. grandis* | 0.5 | 7,500 | 468,500 | 234250 |
| | *E. terticornis* | 0.25 | 3,750 | 1,063,000 | 265750 |
| **Sub - total** | | **6.75** | **101,250** | | **721200** |
| **April** | *P. kesiya* | 0.25 | 3,700 | 49,400 | 12350 |
| **2014** | *E. saligna* | 0.5 | 7,500 | 566,000 | 283000 |
| | *S. siamea* | 0.5 | 900 | 17,000 | 8500 |
| | *A. lebbeck* | 5 | 5,000 | 5,500 | 27500 |

| Month | Species name | Qty. (Kg) | Amount (Mk) | Germination /Kg | Expected No. of seedlings |
|---|---|---|---|---|---|
| | *F. albida* | 5 | 5,000 | 5,000 | 25000 |
| | *E. terticornis* | 0.5 | 7,500 | 1,063,000 | 500000 |
| **Sub - total** | | **11.75** | **29,600** | | **856350** |
| **May** | *A. polyacantha* | 1 | 1,000 | 9,000 | 9000 |
| **2014** | *B. nyasica* | 0.2 | 3,000 | 798,000 | 159600 |
| | *E. souveolensis* | 1 | 1,000 | 2,000 | 2000 |
| **Sub - total** | | **2.2** | **5,000** | | **170600** |
| **June** | *F. albida* | 1 | 1,000 | 5,000 | 5000 |
| **2014** | *B. petersiana* | 1 | 1,000 | 2,000 | 2000 |
| | *A. quanzensis* | 1 | 1,000 | 300 | 300 |
| | *E. souveolensis* | 1 | 1,000 | 2,000 | 2000 |
| | *P. oocarpa* | 0.13 | 2,000 | 45,500 | 5915 |
| | *A. lebbeck* | 1 | 1,000 | 5,500 | 5500 |
| | *E. grandis* | 0.1 | 1,500 | 468,000 | 46800 |
| | *S. siamea* | 0.25 | 450 | 17,000 | 4250 |
| | *T. ivorensis* | 0.5 | 750 | 6,000 | 3000 |
| | *A. lebbeck* | 0.5 | 500 | 5,500 | 2750 |
| | *P. kesiya* | 0.25 | 3,750 | 49,000 | 12250 |
| | *S. spectabilis* | 0.5 | 900 | 29,500 | 14750 |
| | *S. siamea* | 0.5 | 900 | 17,000 | 8500 |
| | *T. ciliata* | 0.5 | 3,000 | 251,000 | 125500 |
| | *W. whyitei* | 0.05 | 300 | 25,000 | 1250 |
| | *F. albida* | 264 | 264,000 | 5,000 | 1320000 |
| **Sub - total** | | **272.28** | **283,050** | | **1,559,765** |
| **GRAND TOTAL** | | **859.79** | **MK1,187,940** | | **9,043,145** |

**Appendix 2. Processed Seed**

| Species Name | Local Name | Provenance | Final Weight (Kg) |
|---|---|---|---|
| *A. adianthifolia* | Mtangatanga | Zomba | 6.2 |
| *A. lebbeck* | Mtangatanga | Chikhwawa | 77 |
| **A. lebbeck* | Mtangatanga | Sakata | 15 |
| **A. lebbeck* | Mtangatanga | Chikhwawa | 357 |
| *A. polyacantha* | Mthethe | Sunuzi | 4.5 |
| *A. polyacantha* | Mthethe | Golomoti | 34 |
| *A. polyacantha* | Mthethe | Changalume | 11.5 |
| **A. polyacantha* | Mthethe | Golomoti | 40 |
| *A. polyacantha* | Mthethe | Mtakataka | 35 |
| **A. quanzensis* | Msambamfumu | Mangochi | 256 |
| *A. quanzensis* | Msambamfumu | Golomoti | 5 |
| **B. thonningii* | Chitimbe | Chingale | 25 |
| *B. nyasica* | Mvule | Masenjere (CK) | 20.4 |
| *C. bonduc* | Kapatamgwilire | Zomba | 2.2 |
| *E. camaldulensis* | Bulugamu | Min arboretum (DZ) | 15.5 |
| *E. grandis* | Bulugamu | Kazera site (DZ) | 29 |
| **G. sepium* | Gilisidia | Chikhwawa | 44 |
| **G. sepium* | Gilisidia | Naungu | 38.4 |
| **G. sepium* | Gilisidia | Thondwe | 27 |
| *G. sepium | Gilisidia | Muona | 88 |
| **K. anthotheca* | Mbawa | Zomba City | 481 |
| *L. leaucocephala* | Lukina | Mayaka | 32 |

| Species Name | Local Name | Provenance | Final Weight (Kg) |
|---|---|---|---|
| **L. leaucocephala* | Lukina | Sakata | 4.3 |
| *M. azederach* | Indya | Mayaka | 163 |
| **M. oleifera* | Chamwamba | Chikhwawa | 32 |
| *M. oleifera* | Chamwamba | Golomoti | 8 |
| *P. elliottii* | Paini | NCB / Dedza | 0.6 |
| *P. kesiya* | Paini | Chongoni | 50 |
| *P. kesiya* | Paini | Chongoni | 1.7 |
| *P. oocarpa* | Paini | Chongoni Cpt.3 | 18 |
| *P. pseudostrobus* | Paini | Chongoni | 2 |
| *P. taeda* | Paini | TB 69/2/3 Chongoni | 2.6 |
| **S. siamea* | Keshya wamilimo | Mangochi | 88.3 |
| **S. siamea* | Keshya wamilimo | Mangochi | 28 |
| **S. siamea* | Keshya wamilimo | Mtakataka | 26 |
| *S. siamea* | Keshya wamilimo | Golomoti | 12 |
| **S. siamea* | Keshya wamilimo | Golomoti | 20 |
| **S. spectabilis* | Keshya wamaluwa | Sakata | 19 |
| **S. spectabilis* | Keshya wamaluwa | Kasungu | 31.2 |
| **T. vogellii* | Wombwe | Zomba | 25 |
| **TOTAL** | | | **2175.4** |

* Denotes seed bought from local communities

**Appendix 3. Tree seed species sold**

| Species name | Local name | Qty. (Kg) |
|---|---|---|
| *A. adiathifolia* | Mtangatanga | 30 |
| *A. lebbeck* | Mtangatanga | 114.25 |
| *A. polyacantha* | Mthethe | 15.9 |
| *A. quanzensis* | Msambamfumu | 58 |
| *B. nyasica* | Mvule | 1.67 |
| *B. petersiana* | Mphandula | 1 |
| *C. bonduc* | Kapatamgwilile | 2.2 |
| *C. lustanica* | Mkunguza | 1.5 |
| *C. mopane* | Tsanya | 6 |
| *E. camaldulensis* | Bulugamu | 0.24 |
| *E. grandis* | Bulugamu | 1.6 |
| *E. Maidenii* | Bulugamu | 2.7 |
| *E. saligna* | Bulugamu | 0.5 |
| *E. souveolensis* | Mwavi | 2 |
| *E. terticornis* | Bulugamu | 0.95 |
| *F. albida* | Msangu | 376.6 |
| *G. sepium* | Gilisidia | 66.5 |
| *K. anthotheca* | Mbawa | 31.66 |
| *L. leaucocephala* | Lukina | 11 |
| *M. azederach* | Indya | 6.6 |
| *M. oleifera* | Chamwamba | 44.6 |
| *P. kesiya* | Paini | 9.35 |
| *P. oocarpa* | Paini | 2.25 |
| *P. taeda* | Paini | 2 |

| **Species name** | **Local name** | **Qty. (Kg)** |
|---|---|---|
| *S. sesban* | Jerejere | 8.66 |
| *S. siamea* | Khesya wamilimo | 25.8 |
| *S. spectabilis* | Khesya wamaluwa | 5.5 |
| *T. ciliata* | Sedeleya | 0.7 |
| *T. ivorensis* | Mkuryungu | 2 |
| *T. sericea* | Naphini | 4 |
| *T. vogellii* | Wombwe | 13 |
| *W. whyitei* | Mulanje Cider | 0.05 |
| *Z. mauritiana* | Masau | 11 |
| TOTAL | | **859.7** |

Appendix 3. Tree Seed issued for free

| Month | Species name | Local name | Provenance | Qty (Kg) | Beneficiary |
|---|---|---|---|---|---|
| **Sept.** | *A. lebbeck* | Mtangatanga | Ngabu | 4 | Mulanje DFO |
| **2013** | *F. albida* | Msangu | Mangochi | 2 | Mulanje DFO |
| | *B. nyasica* | Mvule | Masenjere | 0.3 | Mulanje DFO |
| | *L. leucocephala* | Lukina | Mayaka | 2 | Mulanje DFO |
| | *M. oleifera* | Molinga | Chikhwawa | 2 | Mulanje DFO |
| | *B. thonningii* | Chitimbe | Chingale | 2 | Mulanje DFO |
| | *Peric. angolensis* | Muwanga | Machinga | 0.01 | Mulanje DFO |
| | *A. nilotica* | Chisiyo | Mangochi | 1 | Lab. |
| | *M. azederach* | Indya | Mayaka | 1 | Lab. |
| | *G. sepium* | Gilisidia | Naungu | 0.3 | Lab. |
| | *A. quanzensis* | Msambamfumu | Mangochi | 1 | Lab. |
| | *M. oleifera* | Molinga | Chikhwawa | 0.2 | Lab. |
| | *E. maidenii* | Bulugamu | Dedza | 0.2 | Lab. |
| | *A. lebbeck* | Mtangatanga | Ngabu | 1 | Lab. |
| | *Z. mauritiana* | Masau | Golomoti | 1 | Lab. |
| **Sub - total** | | | | **18.01** | |
| **October** | *E. maidenii* | Bulugamu | Dedza | 2.5 | Plantations |
| **2013** | *K. anthotheca* | Mbawa | Zomba | 1 | Local farmers |
| | *A. lebbeck* | Mtangatanga | Ngabu | 1 | Local farmers |
| | *A. polyacantha* | Mthethe | Sunuzi | 1 | Local farmers |
| | *S. siamea* | Keshya | Mangochi | 0.5 | Local farmers |
| **Sub - total** | | | | **6** | |
| **March** | *F. albida* | Msangu | Mangochi | 0.15 | Lab. |
| **2014** | *K.anthotheca* | Mbawa | Zomba city | 0.5 | Lab. |
| | *Z. mauritiana* | Masawo | Golomoti | 0.25 | Lab. |
| **Sub - total** | | | | **0.9** | |
| **April** | *S. spectabilis* | Keshya | Kasungu | 0.23 | Lab. |
| **2014** | *S. siamea* | Keshya | Mangochi | 0.21 | Lab. |
| | *T. sericea* | Naphini | Machinga | 0.15 | Lab. |
| | *M. azederach* | Indya | Mayaka | 0.3 | Lab. |
| | *C. mopane* | Tsanya | Liwonde | 0.5 | Lab. |
| | *D. regia* | Mchekeche | Liwonde | 0.31 | Lab. |
| **Sub - total** | | | | **1.7** | |
| **May** | *P. kesiya* | Paini | Dedza | 10.16 | RFO (Centre) |
| **2014** | *P. oocarpa* | Paini | Dedza | 3 | RFO (Centre) |
| | *E. amadulens* | Bulugamu | Dedza | 0.27 | RFO (Centre) |
| | *E. saligna* | Bulugamu | Dedza | 0.05 | RFO (Centre) |
| | *E. terticornis* | Bulugamu | Dedza | 0.02 | RFO (Centre) |

| Month | Species name | Local name | Provenance | Qty (Kg) | Beneficiary |
|---|---|---|---|---|---|
| | *P. kesiya* | Paini | Dedza | 4 | Viphya TP |
| | *P. oocarpa* | Paini | Dedza | 2 | Viphya TP |
| | *P. taeda* | Paini | Dedza | 2 | Viphya TP |
| | *P. patula* | Paini | Zimbabwe | 0.5 | Zomba TP |
| | *P. kesiya* | Paini | Dedza | 0.3 | Zomba TP |
| | *P. oocarpa* | Paini | Zimbabwe | 1.35 | Zomba TP |
| | *P. oocarpa* | Paini | Dedza | 1.35 | Zomba TP |
| | *P. elliottii* | Paini | Dedza | 0.6 | Zomba TP |
| | *P. elliottii* | Paini | Zimbabwe | 0.5 | Zomba TP |
| | *P. taeda* | Paini | Dedza | 0.85 | Zomba TP |
| | *P. taeda* | Paini | Zimbabwe | 0.75 | Zomba TP |
| **Sub - total** | | | | **27.7** | |
| **June** | *S. siamea* | Keshya | Mangochi | 0.2 | Nursery |
| **2014** | *A. polyacantha* | Mthethe | Changalume | 0.5 | Nursery |
| | *B. nyasica* | Mvule | Masenjere | 0.1 | Nursery |
| | *A. quanzensis* | Msambamfumu | Mangochi | 0.67 | Lab. |
| **Sub - total** | | | | **1.47** | |
| **TOTAL** | | | | **55.78** | |

**Appendix 4. Species frequencies in Vinthukutu Forest Reserve**

| Species | Frequency |
|---|---|
| ***Brachystegia floribunda*** | 78 |
| ***Brachystegia spiciformis*** | 42 |
| ***Pseudolachnostylis maprouneifolia*** | 34 |
| ***Brachystegia boehmii*** | 27 |
| ***Bobgunia madagascariensis*** | 20 |
| ***Brachystegia longifolia*** | 19 |
| ***Brachystegia manga*** | 14 |
| ***Bauhinia thonningii*** | 12 |
| ***Burkea africana*** | 12 |
| ***Pinus patula*** | 11 |
| ***Delonix regia*** | 10 |
| ***Diplorhynchus condylocarpon*** | 8 |
| ***Pericopsis angolensis*** | 6 |
| ***Julbernadia globiflora*** | 5 |
| ***Pterocarpus angolensis*** | 4 |
| ***Cordyla abbyssinica*** | 3 |
| ***Maprounea africana*** | 3 |
| ***Heteremopha trifoliata*** | 2 |
| ***Isoberlinia angolensis*** | 2 |
| ***Jatropha curcus*** | 2 |
| ***Lonchocarpus capassa*** | 2 |
| ***Monotes africana*** | 2 |
| ***Parinari curatellifolia*** | 2 |
| ***Combretum apiculatum*** | 1 |
| ***Crossopteryx febrifuga*** | 1 |
| ***Diospyros kirkii*** | 1 |
| ***Lannea discolor*** | 1 |
| ***Ochna schweinfurthiana*** | 1 |
| ***Pterocarpus rotundifolius*** | 1 |
| ***Rothmania angleriana*** | 1 |