FRIM NEWS

Forestry Research Institute of Malawi Newsletter | Issue No. 100 | December 2016

Editorial

Welcome to the 100th issue of the FRIM Newsletter!

As FRIM Newsletter hits the 100th mark, we present to you a new look Newsletter courtesy of Gina Althoff, Communications Officer working with PERFORM. The editorial team feels indebted to her and her organization for the technical support and working relationship that has been established to ensure that FRIM continues to disseminate high quality and relevant information to our readers. It should be noted that FRIM Newsletter has come of age having issued the first FRIM Newsletter in April, 1977. In its formative years, the Newsletter mainly covered topical issues on Silviculture, Tree Breeding, Forest Protection, Wood Science and general forestry-related information. Through the past fourty years, the Newsletter has greatly evolved in terms of content, presentation and design and covered a variety of topical issues. Enjoy reading the 100th Issue.

The views expressed in the articles are those of the authors and may not necessarily be those of the Forest Department or the Forestry Research Institute of Malawi.

"Forest research provides knowledge to the forestry sector to derive a wide range of benefits from forests and woodlands that supports sustainable economic growth in Malawi. FRIM is proud to have generated and disseminated this knowledge to the nation through a number of publications. These include FRIM Reports, Peer-reviewed publications, Research Records, Posters, Leaflets and FRIM Newsletters.

The Newsletter has proven to be the most regularly and widely distributed publication. FRIM would therefore like to assure its readers that it will continue to publish and distribute the Newsletter. Therefore, we would like to invite all our valuable Newsletter readers to join FRIM in celebrating its 100th publication. It is our sincere hope that you will continue to find the Newsletter informative and interesting. Enjoy reading!!!"

Dr. T. Chanyenga
Deputy Director of Forestry (Research)

Fun FRIM Facts:

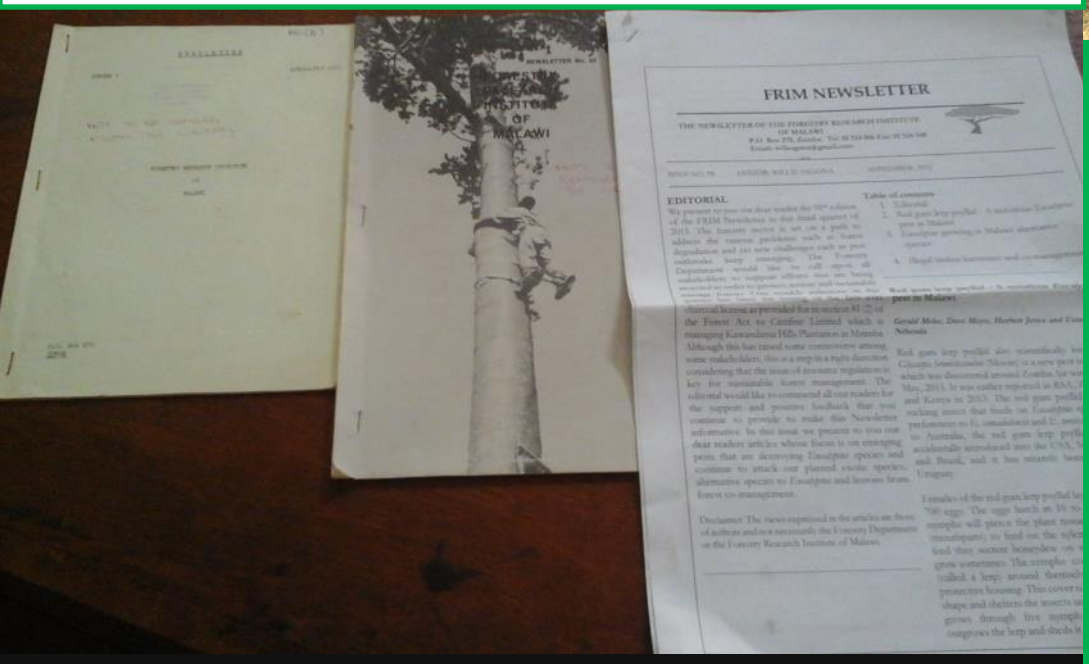
For the 100th issue, the Fun FRIM Facts tell you about our Newsletter– then and now.

Q: When was the first issue published?
A: April, 1977

Q: What topics were most popular among the first issues?
A: Silviculture, Tree breeding, Wood science and Forest protection

Q: How many readers currently subscribe?
A: 210

Q: Where were FRIM offices before relocating to Zomba?
A: Dedza at Malawi College of Forestry and Wildlife



Past FRIM Newsletters

In This Issue:

From El Niño to La Niña: Impact on Afforestration

Willie Sagona

There are a number of natural processes such as *El Niño* and *La Niña* phenomenon which influence local weather, regional climate and global conditions. Besides, there are many anthropogenic forces on the climate such as land use and land use changes which have been attributed particularly to the volume of carbon and greenhouse gases thrust into the atmosphere as people strive to subsist. *El Niño* means *The Little Boy*, or *Christ Child* while *La Niña* means *The Little Girl* in Spanish. The two events are a result of fluctuations and anomalies in the complex water conveyor belts of the ocean currents of the world. These fluctuations are known as "oscillations". *La Niña* is the opposite of *El Niño* and make up an oscillation known as *El Niño* Southern Oscillation (ENSO). These fluctuations occur in oceans and some have a limited impact on the regional weather and wider climate, and some have a much greater impact. Some research has suggested that the effects of the ENSO will worsen as the climate changes.

Malawi's economy is dependent on certain weather conditions occurring regularly and on time (October to April rainfall season) and erratic oscillations have previously and recently caused drought in the country. Knock on effects are still being felt now as the country is food insecure with resultant economic hardships while power generation capacity falls to record low. Both the Shire River and Lake Malawi hit their lowest levels in history, reducing operating flow below 140 cumecs, making it difficult to generate power. This is a worrisome situation considering that household energy needs will continue to largely depend on charcoal from the remaining degraded forest patches which are unsustainably managed. Coming from a drought seasons, it is evident that forest restoration efforts in the last two tree planting season were not up to the mark due to the extreme events of flooding and drought respectively. The flooding events washed away most of the planted trees while the subsequent drought condition with erratic rainfall negatively affected all the set tree planting targets as many seedlings remained in the nursery waiting for the right amount of rainfall or dried out when they were planted out in the field. Worse still, previous forest restoration efforts have been hampered by poor tree seedling survival averaging about 40% due to various reasons apart from drought.

Lately the main rains in Malawi start from November in the south and spread northwards. The main rain bearing systems that influence rainfall over Malawi during this period include the Inter-Tropical Convergence Zone (ITCZ), Congo air mass, Easterly Waves and Tropical Cyclones. These rainfall systems are triggered by the Sea Surface Temperatures (SSTs) over the Pacific, Indian and Atlantic tropical Oceans. Previously, rainfall seasons of 1983-1984 and 2005-2006 were affected by a weak *La Niña* phenomenon of a similar strength like the one expected in 2016-2017 rainfall season. Climatic analyses then showed that Malawi experienced normal cumulative rainfall amounts. However, a greater part of the southern half of the country experienced above normal rainfall amounts while some parts in the northern half experienced below normal rainfall amounts. Such seasons, in a way, provided an opportunity for large scale tree planting, but the question is: did we take advantage of such an opportunity in our afforestration drive?

Oceanographers, geographers, climatologists and meteorologists all agree that *El Niño* is likely to be followed by *La Niña*. It is commonly expected that *La Niña* follows immediately after an *El Niño* event, but this is not always the case. *La Niña* is presented by prolonged periods of sea temperatures in a region and the effects of *El Niño* stated above are generally reversed. As a result, instead of drought, flooding events are expected in the coming rainfall season if not both extremes. Memories are still fresh of the recent destructive 2015 flooding events which washed away all the trees along the water channels and these areas need to be put under special management to avoid a repeat. During the last forest season, few seedlings were planted and survived the drought to the extent that many overgrown seedlings have been retained in the nursery as they could not be planted out due to the drought. These tree seedlings continued to occupy nursery space which could have been used by new nursery stock thereby affecting the numbers for the forthcoming forest season.

The expected *La Niña,* offer an opportunity to the populace depending on level of preparedness. The tricky part is that in the wake of prevailing degraded environment, rainfall amounts in excess of 50mm in 24 hours can be a cause for flooding, which was not the case decades ago. Flood risks can be reduced while enhancing forest restoration, agricultural production and fisheries or aquaculture alongside the potential for water harvesting for future use. Multipurpose dams can be constructed to catch the flood water for irrigation, hydro-power, recreation, floods control in the low lying areas such as the Shire valley, domestic and industrial uses, before the flood water drains into the Zambezi River.

Experience has taught us all the impacts of flooding and drought to rain-fed crops. Forest restoration efforts through tree planting during the forest season is not an end on its own until proper tree management regimes are applied to sustain all other forest regeneration approaches. It is therefore critical for livelihoods and for national economy to appreciate and prepare for the dilemma that may come with extreme weather events such as *El Niño* and the expected *La Niña*. In the absence of such preparedness it makes the transition from *El Niño* to *La Niña* riddled with so many uncertainties in as far as afforestration drive is concerned. This may be a cause for panic because drought has greatly defied our efforts while floods bring with them so many disruptions which adversely affect disaster response thereby frustrating any intended recovery efforts.

Susceptibility of Six *Eucalyptus* Tree Species to *Leptocyde invasa* in Nursery

Gerald Meke, Clement Chilima, Herbert Jenya & Dave Moyo

Malawi and several other countries in Southern, Central and Eastern Africa grow *Eucalyptus* trees widely in plantations and woodlots for economic and social benefits. The species is most preferred due to its fast growing characteristics that ensure quick returns on investment as well as their adaptability to a wide range of environmental and site conditions. Regrettably, *Eucalyptus* trees in the region are now being infested by a range of invasive insect pest species, such as the *Leptocybe invasa* Fisher & LaSalle (*Hymenoptera: Eulophidae*) (Mendel *et al.* 2004).

Leptocybe invasa which is also known as *Eucalyptus* gall-forming wasp, is a native insect species of Australia which has spread to other parts of the world where its host trees are found. The first record of pest in Southern Africa was in South Africa in 2007 and in Malawi, the pest was first recorded in late 2013. A typical infestation by *L. invasa* is associated with formation of galls on the midribs and petioles of young leaves and on the tender bark of twigs. Severely infested trees have a gnarled appearance and show stunted growth, lodging, and twig dieback but heavily infested trees sometimes die prematurely. Thus, severe infestations and rapid spread of *L. Invasa* pose a serious threat to *Eucalyptus* plantations and timber enterprises in Africa.

In Malawi, pest infestation in the field was observed not to be uniform and thus it was hypothesized that some host species are more susceptible or resistant to *L.invasa* than others. A study was therefore carried out in the Forestry Research Institute of Malawi (FRIM) nursery to test this hypothesis on six species of *Eucalyptus* and these are *E.camadulensis, E. grandis, E.microcorys*, *E. tereticornis*, *E. maidenii* and *E. saligna*.

Gall Wasp on a *Eucalyptus*

Infected *Eucalyptus* seedling

Selection of species was based on availability of seeds, demand in terms of utilization as well as distribution in Malawi. The seedlings were transplanted into black polythene tubes that were filled with nursery soil after a month. Seedlings were exposed to *L.invasa* infestation by placing heavily infected *E. grandis* seedlings amongst them. After three months of exposure, each seedling was assessed through infestation severity scoring to record presence of galls on the leaves and petioles.

The results indicated that *L.invasa* caused some level of damage in all the six species suggesting that all of the tested species are susceptible to infestation at least during the early stage of their development. Average damage indices (ADI) and associated damage severity levels for the six *eucalyptus* species are presented in the Table below. Observed results show that *L. invasa* has a wide range of host *Eucalyptus* species with *Eucalytus grandis* being the most susceptible, followed by *E. camadulensis* and *E.saligna*. *Eucalyptus microcorys, E.teretocornis* and *E. maidenii* were the least susceptible. It is disturbing to note that *E. grandis* which is one of the most dominant species in the region is severely infested by *L invasa* in the nursery.

The current results demonstrate the existence of natural resistance in some *Eucalyptus* species. However, studies conducted in Uganda and Kenya indicate that *L. invasa* infestation on *Eucalyptus* is not only influenced by natural resistance, but several other ecological factors such as age of the trees and altitude. Nonetheless, exploitation and use of natural resistance is becoming one of the main environmentally acceptable and sustainable solutions to prevent and control insect pest species in forestry as opposed to frequent use of insecticides. As such, resistant sources need to be identified first for a successful breeding programme to compliment these findings.

Table: Average Damage Indices for *Eucalyptus* Species After Pest Infestation

Species Name	Average Damage Index	Damage Severity Scale
Eucalyptus grandis	2.13±0.01a	Severe
Eucalyptus saligna	1.55±0.23b	Medium
Eucalyputscamadulensis	1.46±0.03b	Medium
Eucalyptus microcorys	0.75±0.03c	Low
Eucalyptus tereticornis	0.66±0.12c	Low
Eucalyptus maidenni	0.65±0.25c	Low

*average damage values that are followed by the same letter are not significantly different at (P=0.05)

Traditional Medicine: *Jateorhiza palmata* in Matandwe

Eric Mbingwani & Willie Sagona

Traditional medicine, according to World Health Organization, is the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness. FRIM in collaboration with other stakeholders has conducted research on different traditional medicinal species in Malawi and beyond. For example, FRIM has studied species ecological distribution, propagation, conservation and even harvesting techniques of such species to ensure species sustainability. One such traditional medicinal species is ***Jateorhiza palmata*** (syn. ***J. columba***) found in Matandwe Forest Reserve and locally known as *Thabalaba* in Nsanje.

Matandwe Forest Reserve in Nsanje has a total area of 26,205 hectares. The reserve is the watershed for several rivers flowing into the Shire such as Malindi, Nyamazere, Phanga, Mchengamalembo, Nyamithuthu, Nyamikolongo and Nyamikango. The vegetation of the reserve is largely miombo woodland dominated by *Brachystegia speciformis* (Mombo), *Braychystegia floribunda* (Tsamba), *Lonchocarpas capassa* (Mphakasa), *Combretum imberbe* (Mtsimbiti), *Acacia galpinii* (Mkunkhu), *Adansonia digitata* (Mlambe) and *Pterocarpus angolesis* (Mlombwa). Since the reserve is deforested and depleted of high value timber species, harvesting of non-timber forest products such as traditional medicine has become one of the central income generating activities for the communities.

J. palmata is a tropical climbing vine which produces large fleshy or tuberous roots native to the tropical areas but can now be found cultivated in many tropical regions, including Brazil. The genus has two species namely *J. palmata* (Lam.) Miers and *J. macrantha*. Of the two, *J. palmata* is found in Eastern and Southern Africa while the other grows in West Africa. The species also grows naturally in Malawi, Mozambique, Tanzania, Kenya, Zimbabwe and South Africa (Kwazulu - Natal). The family name for *Jateorhiza* is *Menispermaceae*. In English, *Jateorhiza* is known as Calumba root. In Chichewa it is known as *Kamsana, Kambvabingu* and *Kanjoka* while in Yao it is known as *Mdyoka*. The root is the source of the formerly popular medicine '*radix calumbae'* that was imported into Europe from Mozambique and Tanzania. It was used against dyspepsia and diarrhoea, and especially suitable for people with a weak stomach. In Tanzania, the root is eaten against snakebites and as a vermifuge. Throughout south – eastern Africa, the roots are considered as tonic and are taken against dysentery and diarrhoea, whereas in India they are taken as a bitter tonic with anthelmintic properties, against gastric irritability and vomiting during pregnancy. In Europe, *J. palmata* is still used in laxative herbal mixtures. In Malawi, similar uses have also been reported by various researchers in different parts of the country.

There are few areas that are known where people harvest *J. palmata* in Malawi. In Matandwe forest reserve in Nsanje district, *J.palmata* is found along stream or river banks with rock deposits. It generally grows in undisturbed fertile soils. In customary woodlands, it is also found along stream banks as well as in very fertile undisturbed soils. Recent study results showed that there is generally low availability of *J. palmata* in Matandwe forest reserve as mean stocking density was found to be 16 ±4 stems/ ha.

J. palmata is one of the livelihood options for people in Nsanje district as the tuber is used as traditional medicine and recently it has been harvested in large quantities and sold to middlemen for resale. The cause for concern has been raised due to its present status where it is harvested in large quantities. Nonetheless, to treat an ailment, only small quantities are used, usually a fraction of a tuber.

The ecology of *J. palmate* has not been well studied, but it has been observed to grow in rain forest and fringing forest, up to 1500 m altitude. In Malawi, the plant is reported to grow within a wide range of elevation from 500 to 2,300 metres above sea level in rich fertile, moist, warm soils. The tuber is a perennial plant; however, the above ground vegetative part dries in the dry season only to resurface from the tuber in the rainy season. *J. palmata* can be propagated through root and sometimes seed and generally grows in the wild. However, there have been reported efforts to cultivate it in Mozambique, Brazil, India and Malawi. Traditional healers in Malawi collect the tubers and plant them in conditions similar to those prevailing in the wild. However, there has not been any special attention to manage the resource in the wild. No special studies have been conducted to understand the genetic diversity of *J. palmata.* What is known is that there are currently two species which are confined to two different regions in Africa, yet in Malawi we only have *J. palmata*. However, records indicate that for marketing, traders prefer the bright yellow tubers indicating that there might be some genetic or phenotypic variation within the one species that is found in Malawi. Since there is no any record of selection, breeding and domestication of the resource, the dangers of genetic erosion are remote.

During harvesting, the tubers are dug up and cleaned. To enhance drying, they are cut transversely or obliquely into slices, and are dried in the shade. Communities have reported great loss in weight (80%) of *J. palmata* after drying and as a result communities overexploit the resource in order to compensate for the loss of weight after drying. This is the reason why there is unsustainable harvesting of *J. palmata* in Nsanje district to generate more income. After washing and brushing, the slices are graded and marketed as '*radix calumbae'*. Compact, uniform and bright yellow coloured pieces are preferred. records of it being advertised as herbal bitters. The upsurge in use of herbal and alternative medicine gives hope that commoditisation of this tuber can occur in the near future and this calls for good management to protect the species from extinction.

(continued on page 5)

Jateorhiza palmata in Matandwe (continued)

The drug has a short mealy fracture, slight musty odour and a very bitter taste. It is sometimes adulterated with pieces of sliced rhizome especially in India where pieces of the stem of *Coscini*fenestratum are used to deceive people and care should be taken when sourcing the species from unscrupulous traders. Earlier studies show that locally the root is traded in very small quantities that cannot threaten its availability. However, others have observed that large amounts have been dried and exported to RSA and Botswana. Although the current extent of the trade is not well recorded, reports indicate that there are high prospects for *J. palmata* to acquire a commercial status. Though information is not readily available on how much is demanded and its other uses, there are on-line advert records of it being advertised as herbal bitters. The upsurge in use of herbal and alternative medicine gives hope that commoditisation of this tuber can occur in the near future and this calls for good management to protect the species from extinction.

Announcements

PERFORM's Forest Inventory

FRIM was part of the team that conducted Forest inventories in July, 2016 for PERFORM in Liwonde, Ntchisi and Perekezi Forest Reserves to assess the current forest stock. Two FRIM members served as Team Leaders in this activity. A final report on the Inventory is yet to be released.

Climate-Smart Agriculture Suitability Workshop

An interactive workshop in Zomba in which 23 delegates from various District Offices, NGOs, civil society organisations and research institutions took part in a range of discussions. The workshop was part of Dr Schaafsma's ESPA Early Career Research Fellow Grant (FELL-2014–104), supported by the Ecosystem Services for Poverty Alleviation (ESPA) programme. The ESPA programme is funded by the Department for International Development (DFID), the Economic and Social Research Council (ESRC) and the Natural Environment Research Council (NERC). The main question of the workshop was to assess the suitability of climate-smart agriculture for Zomba District in the context of river basin management. The delegates discussed four different scenarios of climatic change and economic development and identified under each scenario which climate-smart agricultural techniques would be most suitable in Zomba, how these techniques would benefit stakeholders, and what the trade-offs with environmental, economic and social policy objectives would be. A range of policy interventions was identified for each scenario, highlighting the need for basic and specialist skills development among farmers and extension service providers, policy harmonisation and implementation, and visionary rural development strategies.

Economic Valuation of Forest Ecosystem Services Workshop

A workshop on economic valuation of forest ecosystem services was conducted by University of Southampton for research officers at FRIM in Zomba in March, 2016. The one-day workshop, which was attended by members of FRIM, provided an introduction to the concepts of ecosystem services assessment, monetary valuation of forest and agriculture services, and the different methods that can be used. Several examples from Malawian studies or those relevant to Malawi were discussed. The workshop highlighted the need for reliability and validity to generate policy relevant results. This workshop provided a basis for future work by FRIM in the area of monetary valuation of forest goods and benefits.

Forestry Restoration Studies Conducted by University of British Columbia Students

Six students from Department of Forest & Conservation Science of the University of British Columbia were in the country from end May to end August, 2016 to conduct Forest Restoration studies using different approaches in collaboration with FRIM. The students were under the supervision of Assistant Professor Jeanine Rhemtulla and while in Malawi the studies were coordinated by Willie Sagona of FRIM.

Eucalyptus pests' biological agents multiplication

FRIM is currently multiplying biological agents in Zomba and Kasungu pending their mass release for the control of *Leptocybe invasa* and Red gum lerp psyllid (*Glycaspis brimblecombei)* which are attacking Eucalyptus trees in the country. The biological agents which have been christened as *Ninjas* by our entomologist were imported from South Africa. We will give you more details on this work in our next issue.

Our Mission

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

Contact Us

Contact us for more information about our research and work.

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