

Miti

- Muguka; a blessing or a curse
- Shrubs that can be used for a hedge
- Quality standards for plantation establishment & maintenance
- Protecting Water Towers for prosperity

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THE TREE FARMERS MAGAZINE FOR AFRICA

A Publication of Better Globe Forestry

Issue No.37 January - March 2018

**Landscaping and the
Landscape Profession in Kenya**

**Roadside nurseries; beautifying
landscapes, making money**

**Overview of landscaping
in Uganda**

**Beautiful indigenous
trees and shrubs for
landscaping in Kenya**



Schools' Green Initiative Challenge

Wonders of Dryland Forestry



Schools'
green
initiative
challenge

The Schools' Green Initiative Challenge is a unique project implemented by KenGen Foundation in partnership with Better Globe Forestry and Bamburi Cement Ltd.

The main objective is the greening of over 460 acres in the semi-arid counties of Embu, Kitui and Machakos with Mukau (*M. Volkensii*) and Muveshi (*S. Siamea*) tree species as a way of mitigating climate change and providing wood fuel and alternative income opportunities for the local communities.

Through the setting up of woodlots in participating schools, the project acts as a change agent to establish a tree-planting culture for multiple benefits in dry-land areas.

The ten-year project is designed as a competition amongst the participating institutions for the highest seedling survival rates through the application of various innovations at the schools' woodlots.

Currently, there are 120 schools from the three counties taking part in the afforestation contest for the ultimate prize of educational trips, scholarship opportunities, and other prizes. Plans are underway to add more schools in the coming years.

The afforestation competition is in line with the Government of Kenya's Vision 2030 to achieve 10% forest cover across the country.

Panda Miti, Hifadhi Mazingira





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On the cover:
Underused in landscaping: lianas and creepers. Fuchsias (purple flowers), Lonicera or honeysuckle (white flowers) and a Hypericum (yellow flowers) make a beautiful frame for a window. Photo taken in Nairobi. Done by people with good taste without degree in landscaping.



Dear readers,

The lead theme of this issue is “Ornamental trees & shrubs and landscaping”. East Africa is rich in indigenous tree & shrub species with a potential for ornamental use, and it was a real pleasure to compose this issue of the Magazine. It became a bit an issue on biodiversity as well, as far as indigenous flora was considered. Most of the articles are about the lead theme, and only 5 about other subjects. There is plenty of photos, more than usual, and we still had to restrict ourselves.

The tone is set by the first articles by JB Mukundi of Jomo Kenyatta University of Agriculture & Technology, and Fred Yiiki of Makerere University, on landscaping studies and the profession, in respectively Kenya and Uganda. This is followed by a first article on ornamental trees, by Francis Gachathi, and by an article on live fences or hedges, by Roger Sharland. It's amazing what fences can do when they are composed of plants. Then “la pièce de résistance”, which is the top twenty of ornamental trees & shrubs in Kenya and Uganda, by myself and McRae Muthomi, and Gerald Eilu (Makerere). It shows an overlap between the two countries, and was an exercise in restraint, as so many more species were suitable (maybe we should have gone for a top hundred). Francis Gachathi then presents the sausage tree, good for making drinks –muratina- not only for planting. The following three articles dwell on commercial aspects of landscaping, with JB Mukundi and his colleague Wariara Kariuki (both JKUAT) writing on informal nurseries in Nairobi; M. Muthomi interviewing such a nursery operator (actually doubling as a landscaping practitioner); and Diana Ahebwe talking to a landscaping professional in Uganda; both individuals being quite successful. Jane Gitau talks to an entrepreneur dealing in health in the form of yangu oil pressed from the seeds of the Cape chestnut.

Then for something completely different; I write on muguka, kind of miraa (*Catha edulis*) for the less well-off, a crop in the ascendancy although with quite negative social impact. Thereafter comes an article by a team of ICRAF Uganda on an agroforestry project in the Mt Elgon region of Uganda, followed by a controversial proposal on getting the Kenyan Government's forestry estate on a higher commercial foothold (by myself, based on some brainstorming with Benson Kanyi of the Tree Biotechnology Programme). To finalise, our traditional water-related article, which comes from Michael Muratha of Kenya Forest Service, on a project aiming at protecting the Kenyan Water Towers.

Enjoy. Cheers.



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SPGS continues with its clients meetings

Now in its third phase and managed by FAO and the Ugandan Government

By DIANA AHEBWE



Clients attending the training. Photo Miti Uganda

A total of 504 beneficiaries of the tree planting grant consisting of small, medium and large private sector tree growers throughout Uganda have signed grant support agreements with FAO through the United Nations Office for Project Services (UNPOS) since June 2016 when the project commenced. The grant aims at stimulating private sector investment in commercial tree planting to help meet medium and long-term industrial and market demand for sawlog products, ensure downstream processing and promote efficient use of forest resources such as timber.

As a precondition for the grant, grantees are expected to meet minimum standards of performance in terms of plantation establishment. It is upon this background that learning field tours for grantees across the country were categorized into four groups: (i) the Albertine cluster, (ii) the Central and part of the Eastern cluster, (iii) the Western and South-Western clusters and (iv) the Northern, West Nile, Karamoja & the rest of the Eastern clusters. The target groups were the grantees, key stakeholders from EU delegation, Ministry of Water & Environment (MWE) the Forest Sector Support Department (FSSD), the National Forestry Authority (NFA) and the Ugandan Timber Growers Association (UTGA).

The Central and Eastern Cluster field tour took place at Fersdult's plantation in Buikwe district on 16th November 2017 and thereafter, a meeting was held on 17th November 2017 in Jinja town. Fersdult's plantation was selected for the tour and practical work because it exhibits good plantation management practices and it is also a beneficiary of SPGS. Fersdult has so far planted 355 hectares in Buikwe district in addition to other districts such as Gomba, Rakai and Mukono. Fersdult is a model project because it has a number of forest projects e.g. a nursery, plantations (both Eucalyptus and Pine), a pole treatment plant with a capacity to produce 180,000 treated poles per annum, as well as a small portable band sawmill which is used to convert pine thinnings into timber. The materials used in pole treatment plants are obtained from their own plantations and also from local farmers. The treated poles are mainly sold on the local market because of the high demand. Fersdult has also employed a number of people from inside and outside the community and these include the forest manager, two forest supervisors, four contractors and 120 casual workers.

The objective of the field tours was to create a platform to learn and share experiences especially with the grantees since most of them are new to the project. The tours were held

under the theme: Establishing Quality Forest Plantations. FAO demonstrated critical forestry concepts including selection of planting material (seed/seedlings), planting and chemical weed control. Grantees were also given updates on key project developments. Some of the recommended species by FAO/SPGSIII include *Araucaria cunninghamii* (Hoop pine), *Eucalyptus grandis* (blue gum), Eucalyptus hybrids, *GU & GC* clones (this is *grandis* x *urophylla* and *grandis* x *camaldulensis* hybrids), *Tectona grandis* (Teak), *Pinus caribaea var. hondurensis* (Caribbean pine), *Pinus oocarpa* (Nicaraguan pitch pine), *Terminalia superba* (limba, fraké) etc depending on the region. Grantees were given an opportunity to ask questions and also raise their concerns. Those that had not qualified (acquired the standards for the first installment) were advised to correct their mistakes such as proper weeding and proper planting material. Lists of SPGS certified seedling nurseries, certified clonal nurseries as well as certified contractors were distributed to the members which guarantee quality because in order to be certified, you must have met the minimum standards/requirements set by FAO/SPGSIII.

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Landscaping and the Landscape Profession in Kenya

Jomo Kenyatta University of Agriculture & Technology has taken a lead

By JOHN BOSCO MUKUNDI



Colonial era landscaping in Karen, a suburb of Nairobi, incorporating natural vegetation in the garden (the house was built in 1925). The lawn takes a central place. Photo McRae Muthomi.

Background of Landscape Profession

The actual origins of the modern field of landscape design can be traced back to at least 4000 years of human civilization wherein lies immense physical evidence of ornamental horticulture and landscape design. These pieces of evidence include the Egyptian tomb paintings of 1500 BC, the traditional gardening styles of Persia, the hanging gardens of Babylon (540 BC) and the Ptolemy gardens of Alexandria that later spread to Rome in Europe in the period 100 BC to AD 500. In Asia this history is evidenced by the zen gardens that arose in China and Japan that represented miniaturized natural landscapes. The formal gardening styles took root in Europe in the 16th and 17th century with examples such as Hyde Park in London, 1603, the renaissance gardens in Rome around 1650, and the formation of first Scottish botanic garden in Edinburgh around 1670. At the same period, the imperial garden, Katsura, and Shugaku pleasure garden,

both in Japan, were created in 1659. To date they have retained their unique symbolic design and continue to appeal to people, while in the Islamic world formal creative designs thrived. The 18th century was marked by major developments in gardening such as establishment of the Royal Horticultural Society in England in 1804 that contributed greatly to garden design and training for communities.

There was also new literature on landscape gardening such as that by Andrew J. Downing in 1841, an American landscape designer, horticulturalist, writer and mentor to Fredrick Olmsted. Gardening in the early 19th century was transformed through new design styles that incorporated nature and aimed for enjoyment by all.

Between 1822 to 1903, Fredrick Law Olmstead with Calvert Vaux designed Central Park in New York as the first major landscape design work meant for the public, undertaken through

the dedicated professional tasks of designing a composition of planting, landform, water, paving and other structures. To date it remains a flagship for the landscape professionals in United States and the world (Rosenzweig et al. 1992).

Basically, the wider landscape practice is a multi-disciplinary field, incorporating aspects of botany, agriculture, horticulture, the fine arts, architecture, industrial design, geology and earth sciences, environmental psychology, and ecology.

Landscape profession in Kenya

Landscape design as a profession is a relatively new field in Kenya. Its practice and existence has been largely foreign-expert driven for example. The practice of landscape gardening and design, has been in existence since the colonial times as evidenced by initiatives such as the creation of City Park and its nursery in 1940 under Mr. Greensmith, the then parks superintendent, for the purpose of providing planting materials and other beautification services to open spaces within the city of Nairobi. Design of most golf courses that dot our urban landscape such as the Royal Nairobi golf, Muthaiga golf course and the Windsor golf course is largely the work foreign experts (Kenya Golf Union, 2000).

Landscape design and gardening services have continued to thrive and develop in tandem with urban development of residential estates, recreational parks and shopping centres. Individuals engaged in development of the landscape industry business in Kenya are varied in their background, from individuals driven by personal interest in landscape gardening or long-term experience gained from working with foreign experts, to those trained in ornamental horticulture, forestry and architecture. These players offer services through established plant propagation nurseries, retail nursery and garden centres, wholesale and landscape nurseries. The services range from landscape design, site preparation, landscape installation and landscape maintenance. The clients are mainly derived from individual home owners, housing estates,



A row of *Newtonia buchananii* (mukui, makurumi) as avenue lining, becoming a beautiful shade tree (eight years old). Photo Jan Vandenabeele.

A romantic path in the nursery of "Tropical Nurseries", Gede. Photo Jan Vandenabeele.



Innovative thinking on soil protection (and weed suppression): soil coverage with coconut husks at the Kenyan coast (Tropical Nurseries, Gede). Photo Jan Vandenabeele.



institutional grounds such as hospitals, industries and educational; recreational parks, hotels and cottages.

Formal training in landscape related courses started in 2001 by the launching of two undergraduate programs, the B.Sc. Environmental Horticulture and Landscaping Technology in the Department of Horticulture and the Bachelor of Landscape Architecture in the School of Building Sciences; both in Jomo Kenyatta University of Agriculture and Technology. The main difference in training is that the former group is well trained in planting design, interior plant-scaping and horticultural sciences while the latter group is well trained in graphic arts, urban design and architectural technology. Graduates of these programs are expected to play a significant role in planning and designing of the outdoor landscape in the natural and the modified landscape. Initial graduates who have entered into the landscape business have been well absorbed as more of the citizenry especially in urban areas appreciate the value of professionally designed and landscaped home gardens, recreational parks and other open spaces. To a large extent, the practice of landscaping in Kenya overlaps significantly with what Hannebaum (2000) defines as landscape design. In order to build human capacity in understanding of the composition, structure and function of landscapes for sustainable development, a Master's program in Landscape Planning and Conservation was launched in the department of Horticulture in the year 2008. The program incorporates aspects of landscape aesthetics, landscape ecology and spatial techniques of remote sensing and geographical information systems (GIS) in landscape studies.

Divisions of Ornamental Horticulture

Majors: Floriculture, Nursery Plant Production, Turf

grass Culture and Management, Arboriculture, Landscape Horticulture and Design.

Related fields: Soil Science, Botany, Ecology, Forestry, Geography, Civil works, Design and Graphics.

Career opportunities

Nursery and greenhouse production; speciality pot plants; floral design (flower shop manager, florist); turf grass industry (sod production, lawn construction; sports turf management (golf courses, soccer fields, rugby fields, tennis and cricket courts); landscape design and management; street tree management, planting design, speciality gardening, research, training, writer / communication.

Challenges and Future Expectations

As the economy grows and human activities intensify, landscape patterns and processes will get altered markedly and increasingly impact on livelihoods. Graduates of Environmental Horticulture and Landscape Technology and those from related professions are towards forming an association of Landscape Designers and Green Keepers to promote and market the field landscape science and design. The aim will be to bring together actors in these field who may include horticulturalists, foresters, botanists, conservationists, designers and green keepers. One of the challenges for trained landscape professionals has been a lack of active code of practice to ensure professionalism in project execution. Another draw-back has been lack of an umbrella organization that brings together experts in the landscape profession, similar to the Japanese Institute of Landscape Architects (JILA, homepage) or the Landscape Institute (LI, homepage) of the United Kingdom, where pertinent issues such as recognition and practice can be better articulated.

The unique nature and contribution of landscape professionals must be understood and promoted as they are different from professionals trained in Architecture, Land Economics, Horticulture or Geography. There is utmost need to strengthen links between university programs in landscape studies with the industry and relevant government ministries. Training and research in landscape science and landscape planning, on the other hand, must be reviewed regularly to incorporate new approaches to landscape studies and application so as to have, not only localized, but also regional scale of application in the planning and conservation of the environment relevant to the unique landscape issues facing Kenya and the surrounding region.

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Overview of landscaping in Uganda

An interview with Fred Yiiki, lecturer at Makerere

By DIANA AHEBWE

What do you understand by landscaping?

Landscaping is the art or science (discipline) of designing, establishing or modifying a natural scenery using trees, shrubs, vines and other physical structures for human well-being and for pleasure. On the other hand, Landscape Design is the process of creating attractive outdoor environments. Thus, in the context of urban areas, Landscape Design improves the visual appeal of urban environments: that is; residential areas, commercial places, educational and health care premises, and other forms of urban landscapes.

The use of plants for landscaping can be traced to the period of human civilization. However, as a discipline, landscaping evolved as a part of landscape architecture which became a profession around 1863. Landscaping continued to gradually evolve and gained popularity in Europe and the US from the 1970s onwards. It is still not clear when the design of urban landscapes gained ground in Uganda. However, it is known that the history of forestry policy in Uganda can be traced to colonial times when the earliest forest reserves were gazetted and forest plantations were established in the country. Landscaping in Uganda has been practiced for a long time but on a localized scale such as homes with planting of trees and flowers in compounds.

What is the importance of trees & shrubs, alongside the grass & flowers? Use of other elements (e.g. fountains, paths, etc)?

Generally, vegetation (trees, shrubs, herbs, grasses etc) plays an important role in urban landscapes. Primarily, they have aesthetic values; that is, values relating to the visual appeal of the plant landscape components or their contribution to the appeal of the landscape as a whole. This may relate to the beauty and diversity growth forms, branching configurations, colour of flowers, texture of leaves and other interesting plant features. Owing to their beauty and attractive designs, such landscapes are often used for recreation purposes, leisure and social events like parties and meetings. Other roles of trees and shrubs in urban landscapes include: monetary roles whereby people can get timber for commercial use from mature trees;



The beauty of indigenous trees: Acacia tortilis (white thorn) as a landscaping element (Moroto district). Photo BGF.

commercialization of fruits from fruit trees; Landscape design using trees also enhances the value of property and generally, people appreciate green environment and are therefore ready to pay more for property with such components compared to the property without trees.

In addition, trees or shrubs enhance environmental protection through minimizing run-off by reducing the speed of water flow as well as retaining water. This is notable in towns where most of the natural resources have been degraded and where the land surface occupied by the built environment is substantial. The trees in a landscape such as botanical gardens also relieve pressure on the natural resources e.g. forests. Further still, trees in landscapes also act as wind breaks in wind-prone areas. Trees and shrubs in urban areas also control glare from the cars as well as purify the air by absorbing dust particles and gases from the atmosphere.

How important is landscaping as a business in Uganda?

In Uganda, landscaping is very important in terms of employment and income. There are many people employed along the value chain of landscaping starting from the seed source, seedling nurseries which are commonly operated

by the informal sector especially on the road side, the architects who do the design and the gardeners who plant the trees, grass and/or flowers. Statistically, it is not clear how many people are involved in landscaping business because there seems to be no research so far in this field, and as expected, operations in the informal sector may not be properly documented.

Who are the key players in the industry?

The key players in the industry are private sector (mostly the informal sector involved in operating roadside nurseries) because not so many people in Uganda have trained in landscaping. In the formal education sector, it is not clear whether any institution of higher learning currently offers it as a degree programme. Although the informal sector seems to dominate this industry, government institutions such as the National Forestry Authority (NFA) supply some of the germplasm, raise seedlings and also engage in planting trees. The other stakeholders in the formal sector that are actively involved in landscaping include: the Kampala Capital City Authority (KCCA), the municipal authorities, Engineers and Architects (few professional Landscape architects) involved in design and construction works.



A great inspiration for landscaping in Uganda: the Entebbe botanical garden. View of a Cycad. Photo Miti Uganda.



A young Podocarpus tree in an urban setting. Photo Gerald Eilu.

Mention some of the successful companies involved in landscaping

"I do not have the authority to rate who is successful in this business of landscaping" says Mr. Yiiki. This is because there are a few known companies involved in landscaping as service providers, businesses and professionals in this industry would be rated properly by their clients or a professional body that regulates their activities. Feedback about service provision in the industry could be obtained from entities with appreciable landscapes such as Munyonyo Commonwealth Hotel, Estella Hotel as well as management of recreation and leisure parks in urban areas in the country. In addition, Authorities such as KCCA that participate in the industry should be able to share their experiences of tree planting and design of road sides in Kampala city.

Which species are commonly used in the landscaping industry?

The composition of the green environment depends on the purpose of landscape design. For example, for environmental or conservation purposes, there is a tendency to populate the landscape with the tree component and other plant forms compared with landscaping done for beauty purposes. Biological diversity also provides additional benefits for conservation of the environment.

Species commonly used in landscaping are categorized depending on the purpose. Residential areas could have different species compared to commercial areas. Most commercial areas plant exotic tree species because they have seen them trending in other places. Common among them are palm trees, Ashok trees (*Polyalthia*

longifolia), Bottle brush (*Callistemon citrinus*), Travellers tree (*Ravenala madagascariensis*), and hibiscus plants. On rare occasions, others plant Eucalyptus and recently Terminalia tree species such as *Terminalia mantaly* are also common.

What are the challenges facing the industry?

Landscaping industry is not properly regulated. This poses a high risk to the industry in terms of quality of services because many people are employed in the informal sector. For example, the seed sources used for raising seedlings in the industry are not known. This might lead to the spread of diseases or production of plants with inherently poor traits. Many clients purchase seedlings from the roadside nurseries which are not properly regulated and yet many of the road side operators simply learn their trade through experience.

There are no known tree breeding programmes for ornamental trees that could be used for designing landscapes. There is thus a tendency for people to adopt species without carrying out any research. Little research has been done and very few universities teach landscaping as an academic programme.

The multidisciplinary nature of the discipline also presents a challenge to the industry. A key challenge in this respect is poor coordination between professionals (e.g Forestry professionals, Horticulturists, Architects, Engineers etc) from the various disciplines that contribute to landscaping. Another challenge is the cost of land which has gone up plus the high population whereby people have limited space to plant trees. There is less funding in the sector therefore less research is done in the industry

with the little funding that comes in from the private sector.

In your opinion what should be done to stimulate the landscaping industry?

More research is required to understand the landscaping industry, especially the demand for services and the species to be planted. The industry needs better regulations, for example: what proportion of a landscape should be covered by a given component (e.g how much of the land should be under trees), what qualifications should be attained to be involved in service delivery in landscaping industry, and what approaches should be used to conserve green spaces in the urban areas? With appropriate regulations, Landscaping holds a great potential for meeting the aesthetic, environmental and architectural needs of urban dwellers.

Roadside nurseries should be regulated e.g people should be trained and the seed source should be investigated. Employers should look for people who are trained in the field e.g foresters can be employed to identify which tree species to plant as well as proper planting.

In conclusion, more training is required in the informal sector because they are the majority in the landscaping business.

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Some ornamental native trees of Kenya

So beautiful, they are thought to be exotic.

By FRANCIS GACHATHI



Adenium obesum, the desert rose, in its native habitat, which is hot and dry areas.

Contrary to common belief that only exotic trees are ornamentals, a number of native species are in fact very decorative in flower and are commonly planted as ornamentals. They include the Nandi flame (*Spathodea campanulata*) also known as African tulip, Cape chestnut (*Calodendrum capense*), Desert rose (*Adenium obesum*) and the Red-hot poker tree (*Erythrina abyssinica*). These are widely planted as ornamentals in gardens, avenues and parks but most people still think they are foreign. In addition to their decorative value, they have other uses.

The Nandi flame

Nandi flame is a deciduous tree, very decorative in flower, with a rounded crown, growing to 15 m high. The bark is grey-brown and smooth, later rough and peeling near the base of the trunk. Leaves are compound, leaflets 9-13, yellow-green,

with soft hairs beneath. Flowers are bright orange-red (a yellow-flowered form exist), in terminal clusters. Fruit is a dark brown woody capsule to 25 cm long, splitting on the ground, releasing lots of flat winged seeds. The yellow-flowered form is said to have originated naturally in a forest in Uganda.

Nandi flame is native to the Lake Victoria basin and Western Kenya in high rainfall areas. As one of very decorative indigenous trees, it is widely planted throughout the country in areas with adequate rainfall, 1,500 – 2,000 mm. It is best in red soil. Its wood is used for firewood and carvings. It is propagated by seeds through direct sowing but for the yellow-flowered form, vegetative propagation from suckers of the parent tree is better as seeds rarely germinate to produce yellow flowers again. There are about 130,000-160,000 seeds per kg. Local names for the Nandi flame include: Kipsigis: Sebetaiyet;



Calodendrum capense, the Cape chestnut.



Spathodea campanulata, **Nandi flame**, with red flowers, as it occurs normally.



S. campanulata, with yellow flowers.

Luo: Nyawed agwata, Madungudungu; Luhya: Kumuchirisia, Mutsulia; Nandi: Sebetaiyet; Pokot: Repko; Teso: Ekakale.

Cape chestnut

Cape chestnut is a deciduous tree, to 15 m high, with a spreading crown. The bark is grey and smooth, young branchlets very densely hairy, later smooth and shiny. Leaves have very prominent parallel veins below. Flowers are pink-white, with dark raised purple dots, in erect heads at the ends of branches. Fruits are round, 5-lobed capsules, splitting open into 5 segments, exposing 8-10, three-angled black seeds.

Cape chestnut is found in dry upland forests, also riverine forests, 1,400-2,300 m. It is best in forest moist soils but does well in drier soils, even in black cotton. It is very common around Nairobi, Kikuyu Escarpment, Meru, Samburu and Nyahururu. Its wood is used for timber; moderately strong and durable, suitable for

general construction, furniture and surgical splints. It is used to make stools, tool handles, cattle troughs and beehives. Seeds contain valuable oil (yangu oil) used for beauty and skin care products, with a reputation for ultra-violet protection. It is very beautiful in full flower. Flowers are good bee forage. Its heavy leaf fall makes good mulch.

Cape chestnut is propagated by seed, through direct sowing of fresh seed at site. Germination may take anything between 10 and 40 days. There are 650-1,000 seeds per kg. Local names for the Cape chestnut include: Kamba: Yangu; Kikuyu: Muraracii, Muroroa; Kipsigis: Kipkaria, Sasuriet; Maasai: OI Iarashi; Meru: Mujai, Mujura; Nandi: Kipkarkuriat; Pokot: Ocharasliit; Samburu: Larachi; Taita: Mogorusi; Taveta: Murei.

The Desert rose

The desert rose is a succulent shrub or small tree to 5 m high with lower stem often being swollen and with all parts producing a clear or white sap when injured. It has grey-green or brown smooth bark and somewhat fleshy leaves clustered at the ends of branches. It has white to reddish pink, trumpet-shaped flowers, usually appearing before the leaves.

Desert rose is very decorative indeed, especially because the beautiful flowers appear when the tree is almost leafless. It is found in hot dry bushland areas, often on rocky sites, from coast to 1,500 m inland. It is often planted as an ornamental. Flowers are much visited by bees for nectar. Seeds are used to prepare a rat poison. Seeds together with the sap from the stem are used to prepare arrow and ordeal poison. Pounded roots are used to treat boils and used to make fish poison as well. It is best propagated through cuttings or wildings. It requires

well-drained sandy soil otherwise cuttings will rot in water. Seeds may also be used but are liable to insect attack. Local names for the Desert rose include: Boran: Obbe; Digo: Mwadiga; Gabra: Obbe; Giriama: Mwadiga; Maasai: Oleteti; Malakote: Tulata; Orma: Muk-fadjie; Pokomo: Koliya; Samburu: Lpirintai; Somali: Uba, Feyid; Swahili: Mwadiga; Taita: Igadaiyu; Turkana: Igales.

The Red-hot poker tree

The Red-hot poker tree is a deciduous tree with a short trunk and stout spreading branches forming a rounded crown. It grows to about 10 m high. The bark is yellowish brown, thick and corky, deeply ridged, sometimes with woody spines. Leaves are compound, with three rounded leaflets, the terminal leaflet the largest, underside of leaves covered with brownish hairs. Flowers are orange-red, in erect heads, often appearing when the tree is almost leafless. Pods are woody, straight or curved, brownish hairy, to 15 cm long, deeply constricted between the seeds. Seeds are bright red and shiny with a black patch.

The Red-hot poker tree is found in many parts of the country in open woodland and grassland, from coastal hills to western Kenya. It has many local uses. The easily carved wood is used to make beehives, mortars, drums and stools. Timber is used for doors. The seeds are used to make necklaces. Flowers are very attractive to birds. The Red-hot poker tree is propagated through seeds or by large cuttings. There are 5,000-8,000 seeds per kg. Local names for the Red-hot poker tree include: Duruma: Mgalla; Kamba: Muvuti; Kikuyu: Muhuti; Kipsigis: Kogoruet; Kisii: Omotembe; Luhya: Murembe; Luo: Murembe; Maasai: Oloponi; Meru: Muuti; Nandi: Kakaruet; Pokot: Korkorwo; Sabaot: Kaborte; Samburu: Garacha; Swahili: Mbambangoma; Taita: Mulungu.

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Erythrina abyssinica, the red-hot poker tree: flowers

Shrubs that can be used for a hedge

Coupling the useful with the ornamental

By DR ROGER SHARLAND



Euphorbia tirucalli (mtupa mwitu) in a hedge. Photo Roger Sharland.



Trimmed Thevetia hedge in Uyoma, western Kenya. Photo Roger Sharland.

A hedge is a line of closely spaced trees or shrubs, planted and maintained to mark a boundary of some sort, whether between properties or within them. Hedges or Live fences are planted for many different reasons; the most common being to delineate a boundary, for privacy, security and for beauty. A hedge however can also be a productive part of any land, and what you chose to plant as a hedge in a farm may be different from that of the home. The species chosen will depend on both the purpose, but also the location. Different species are relevant at different altitudes and rainfall patterns.

If just for a boundary marker, a hedge is often planted from plants chosen for their ease of establishment and succulent plants such as the Finger Euphorbia (*Euphorbia tirucalli*) are used. These however, rarely serve any of the other purposes for which hedges may be planted. The common use of such plants indicates the importance of hedges in rural areas, but also the potential for using the boundary more productively.

Hedges can also develop from trees and shrubs which are growing naturally, or which are self-seeded. Such hedges can be augmented and improved as they are variable in their usefulness. Although indigenous species are widely used as

boundary markers, when the purpose is more than just a boundary, the normal choice is for an exotic species and there are a few indigenous species that can provide what is needed.

When hedges are planted for privacy, the species chosen are most commonly those that grow thickly and reach to a height taller than a human being. Many species may be chosen depending on climatic conditions. In

the wetter highland areas, Cypress (*Cupressus* spp.) is often chosen. In hotter lowland areas, a common choice is the Yellow Oleander (*Thevetia peruviana*), which is originally from Tropical America. Both have the advantage that they can be regularly cut back and pruned as a thick hedge, and kept to whatever height is desired.

Privacy is often combined with security as a need. If security is desired, a hedge is



A Thevetia hedge in Uyoma left to grow tall as a windbreak. Photo Roger Sharland.



Thorns of *Dovyalis caffra* (Kei apple). Photo Roger Sharland



A hedge of *Carissa edulis* (mtanda mboo), suited to dry country and heavy clay soils, with beautiful pinky-white flowers and edible fruits. Is quite impenetrable but difficult to prune. Photo Jan Vandenabeele.



A multicoloured boundary hedge including *Bougainvillea* in Asembo, western Kenya. Photo Roger Sharland.

frequently combined with either a chain link or barbed wire fence. Hedging plants that have thorns that will discourage both roaming animals and human intruders are particularly useful. Probably the most widely used of these is the Kei Apple (*Dovyalis caffra*). There are indigenous thorn trees that can be used, especially *Acacia* species, although they are slow to establish and difficult to train. *Carissa edulis* (mtanda-mboo) is an indigenous wild fruit that has thorns that will keep out both humans and animals, but it is difficult to train.

Particularly in hotter and drier regions, hedges can also have a significant influence in relation to the microclimate of the area which they surround. They often also form a windbreak. This is particularly significant in areas with a longer dry season where winds tend to be high

and the air dry. Within a hedge, a microclimate that is cooler can be created, and species may be chosen for this purpose.

When it comes to beauty there are many options that can and are used. Almost all of these are exotic. *Bougainvillea* is a genus that is particularly suitable. It originates from South America but is now widely distributed throughout the tropics. The actual flower is small and normally white, but each cluster of three flowers is surrounded by brightly coloured bracts that give the colour. *Bougainvillea* has been bred to have many different colours and growth forms, and most are hybrids. The more widespread types have long vines that can climb up to 12 metres, and have long strong thorns. These vines can be woven into impenetrable hedges for security as well as beauty. *Bougainvillea* are

normally propagated from cuttings.

Other species commonly used for beauty include flowering *Hibiscus*, especially the large red flowered *Hibiscus rosa-sinensis* (Rose of China), *Oleander* and other exotic flowering species. They are easily propagated from cuttings. Others that are planted for their beauty have attractive leaves rather than flowers and can also be combined with each other or with flowering species.

The smaller a plot, the higher the proportion of land that is taken up by a hedge. On farmland, hedges are also sometimes used to divide up plots that have either different conditions or different uses. Such hedges need to be composed of species that are compatible with the crops grown in the fields, and it is particularly relevant for such hedges to have other uses apart from



A 6 'F' hedge forming a good fence and producing firewood, fruit, fodder and fibre while adding fertility to the soil. Photo Roger Sharland.



A Sesbania hedge on a farm in western Kenya. Photo Roger Sharland.



Passion fruit growing in a hedge. Photo Roger Sharland



A trimmed Tithonia hedge with teaching on making liquid manure from the leaves ("Tithonia tea"). Photo Roger Sharland

just being a boundary. A useful concept for such hedges is the 6 'F' hedge; the 6 'Fs' are Fence, Fuel (Firewood), Fertility (Fertiliser), Food, Fodder and Fibre. A hedge can be planted that combines most or all of these, with an extra benefit of also being a Pharmacy (Pharmacy).

A 6 'F' hedge can be established relatively easily by choosing the right species. The basis of the hedge is to use three leguminous tree species, namely *Calliandra calothyrsus*, *Leucaena leucocephala* and *Sesbania sesban*. Of these, *Sesbania sesban* is indigenous but the other two originally come from Central America. *Sesbania* is fast growing and establishes the hedge well, but also ages quickly, so does not last as long as the other two. All three can be used as good animal fodder when pruned, though the best nutrition comes from *Calliandra*. *Leucaena* is the most durable of the three and when it grows large is good for making charcoal. *Leucaena*

can be used as a good windbreak. All three are nitrogen fixing, so compatible with crops and help with soil fertility. If the hedge is cut back, the prunings can be lain out on farmland or the vegetable plot. Once the leaves have dried and fallen, the firewood can be collected.

Food can be incorporated in the hedge when vegetable and fruit trees are included. Guava (*Psidium guajava*), mulberry (*Morus nigra*) and *Moringa oleifera* are the most common food trees used in a hedge. *Moringa* leaves are an excellent vegetable as are mulberry leaves, and the mulberry bark is a useful source of fibre or string in the farm.

Once trees and shrubs are established in a hedge, they can also provide support for climbing vines which can also be incorporated into such a hedge. This includes such species as passion fruit (*Passiflora edulis*), aerial yam or air potato (*Dioscorea bulbifera*), chayote (*Sechium edule*)

and some types of gourd or pumpkin of the *Cucurbita* family. The luffa (sponge gourd) may also be another fibre grown in a hedge.

There are also hedges that can be planted on a farm to prevent soil erosion and as sources of soil fertility. The Mexican sunflower (*Tithonia diversifolia*) which originally comes from Central America is a common roadside weed established in many areas. It is an excellent source of available nutrients for a vegetable garden or small farm. It is easy to plant from seeds or cuttings and can be pruned as an ornamental hedge. A neatly trimmed hedge on which the large yellow flowers develop is very decorative and the prunings used either as manure tea or as nutritious mulch to the soil.

Hedges on a farm can also be from herbaceous species. Vetiver grass hedges planted across the contour are particularly helpful for preventing water run-off and soil erosion.

One of the challenges in hedges in recent years has been that if a hedge is from a single species, it becomes very vulnerable to pests and parasites. The cypress aphid (*Cinara cupressi*) has caused considerable loss to Cypress trees over the years, and could cause the death of a whole hedge in one season. In recent years, the parasitic weed, golden dodder (*Cuscuta campestris*), has spread rapidly through Kenya. It is a parasite that kills its host and is particularly attracted to Yellow Oleander and *Euphorbia tirucalli*, causing considerable destruction to hedges. So, if the hedge is just of one species, the whole hedge can be destroyed. A mixed hedge is far less vulnerable to such damage.

Although it is difficult to recommend indigenous trees for planting a hedge, any trees or shrubs that are already growing can easily be incorporated into a hedge. A successful hedge is often one that is made up of different species complementing each other, and chosen for multiple use. Multipurpose trees and shrubs are particularly valuable as hedge species.

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Vetiver grass (*Chrysopogon zizanioides*) hedge preventing erosion while dividing up farmland. Photo Roger Sharland.



Golden dodder (*Cuscuta campestris*) on a *Thevetia* hedge in western Kenya. Photo Roger Sharland.



***Acacia mellifera* (hook thorn, muthia) ideal for semi-arid countryside. It makes an impenetrable fence, that is said even to stop elephants.** Photo Jan Vandenabeele.



***Commiphora* (either *C. africana* or *C. campestris* on the photo) a tree species from ASAL that can be used for a beautiful fence, with big cuttings (poles) simply put into the ground.** Photo Jan Vandenabeele.

Beautiful indigenous trees & shrubs for landscaping in Kenya

A futile attempt to list the top 20

By JAN VANDENABEELE AND McRAE MUTHOMI



Acacia xanthophloea (yellow-barked acacia, munga) relatively fast-growing, can be planted in heavy clay and thrive. Mind you, older trees shed branches with thorns that can pierce tyres. Photo Jan Vandenabeele.

Futile indeed, because the flora of Kenya is so rich, and this listing is limited to an article, it can't be a book. Nevertheless, here is the result, based on (i) limited knowledge, (ii) subjective criteria of what looks good, (iii) commonly used species in landscaping, and (iv) presence of special features like flowers, shape, fruits, provision of shade, and hardiness.

Landscapers like to fill up spaces quickly and hence prefer fast-growing stuff. Now, some species DO grow slowly, like doum palm, though it is a misconception to think that indigenous trees are all slow growers. Most will answer well to good watering and fertilizing, and dealing

with competing weeds and grasses. Though depending on the case, landscapers might prefer something that stays small. Not everybody has a park-sized garden.

The list is alphabetical according to botanical names, and some species are not dealt with here, but reference is made to another article in this issue.

Acacia xanthophloea

The Naivasha thorn tree is a tall acacia species growing up to 25 meters. It is highly preferred in landscape beautification because of its relatively fast growth and tolerance to drought but also because of its greenish-yellow peeling bark and



Afzelia quanzenis (mbambakofi) a spreading leafy tree, excellent for shade, with spectacular black-red seeds in a big flat woody pod. Mostly found at the coast. Photo BGF.

brightly colored leaves. It has been extensively grown in Nairobi along roads, pathways and driveways

Adenium obesum

The desert rose. Dealt with in article on p. 10.

Afzelia quanzenis

Mbambakofi highly threatened at the Kenyan coast for its quality charcoal is a beautiful, deciduous tree with a spreading crown and bearing orange-red flowers. It is predominantly found at the Kenyan coast but there have been claims that it has been found growing on top of Mt. Marsabit.

Albizia gummifera

The peacock flower is a flat-topped tree growing up to 15-30 m high, bearing beautiful flowers, crimson at the top and white at the bottom. It grows higher where it receives more rainfall, and occurs naturally in Kenya from the coast up to 1800 masl.

Calodendrum capense

Dealt with in the article on p. 9.



Albizia gummifera (the peacock flower tree, mukuruwe) an eight-year-old tree hence relatively fast growing. Provides light shade. Photo Jan Vandenabeele.

Cordia africana

Muringa, muvutu, mukomari, is another highly preferred landscaping species in Kenya. It can grow up to 30 meters in the wild and has a spreading umbrella shaped or rounded crown. It is indigenous to Kenya and prefers relatively wet areas. It is deciduous and preferred in agroforestry systems for shade and mulch from leaf fall but recently has found its way into landscaping industry as one of the species being introduced at a fast rate into beautification programs because of its very conspicuous, sweet scented white flowers that are on top of the tree.

Croton megalocarpus

Mukinduri, musine, muthulu, is deciduous, can grow up to 35 m and is common in dry upland forests around Nairobi. It is increasingly being used in landscaping because it is easy to propagate, fast growing, hardy and beautiful looking. In its right habitats where growth conditions are favorable, it has distinctively layering branches that form a rather flat crown. Its leaves are dark green on the upper side and silvery on the underside; these grow smaller in size as the tree ages and becomes taller. It is also preferred in landscaping because of its shade and its yellow-white flowers, it is also relatively fast growing.

Dracaena ellenbeckiana

This is a shrub, 3-6 meters tall branched to form many stemmed clumps. It is ideal for indoor and outdoor use, potted or planted in the open ground and can tolerate full sun. Its clumps and woody, rough and bare stem make it attractive for landscaping.



Cordia africana (Muringa, Muvutu, Mukomari) in bloom with its abundant white flowers. Photo McRae Muthomi.

Dracaena steudneri

Dracaena steudneri (Steudner's dragon tree) is a beautiful tree, up to 18 meters. It has 1 meter long leaves that form like palm leaves and clump near the tip of the stem. Its flowers are pale white-yellow-green, contained in tight clusters all over a big flowering head about 1 m high giving an attractive look. It can be grown along hedges.

Ehretia cymosa

Also known as murembu in Meru, and mutereriet, shekutu and endalati-ekolok, this is a small evergreen tree up to 9 meters tall and occurring in altitudes of up to 2300 m. It is becoming popular in home gardens, along roads and arboretums because of its shade but principally because of its ornamental value. It produces white flowers

in large numbers that attract pollinators and give the ornamental look to landscapes. In private gardens, it is preferred by bird lovers because it produces brightly colored orange-red colored berries that attract birds to compounds.

Erythrina abyssinica

Dealt with in the article on p.10.

Hyphaene coriacia* and *H. compressa

Respectively mkona wa pwani and mkona, the commonly known doum palm. Home to hot areas where they grow when having access to ground water, like aside seasonally dry rivers. Their surviving system for sprouting back after damage is a root shaped like a big onion about



Croton megalocarpus (mukinduri, musine, muthulu) can grow into a big, spreading, tree, good for boundary plantations. Photo McRae Muthomi.



Dracaena ellenbeckiana (**Kedong palm**) a tough shrub from hot, dry areas. Easy to multiply by cuttings. Photo Jan Vandenabeele.



Dracaena steudneri (**Steudner's dragon tree, msanaka, muthare, ofito**), together with an Italian cypress (*Cupressus sempervirens*). Photo Jan Vandenabeele.



Ehretia cymosa (**murembu, endalati-elolok, musuga**), a shrub or many-branched tree with white flowers and orange berries when mature. Photo Jan Vandenabeele.



Erythrina abyssinica (**red-hot poker tree, mbamba ngoma**), a small thorny tree with very attractive flowers. Can stand relatively dry climate. Photo BGF.

a meter below the ground. Mkona wa pwani is the smaller brother of the doum palm, but very similar, and actually grows near the beach, in the tough conditions of salt-laden wind, but can be found more inland. Slow growing, but worth planting.

Markhamia lutea

Markhamia has become common in landscaping in Kenya. Being a fast growing, drought resistant, indigenous and evergreen tree, easy to propagate, it has become familiar in urban roadside nurseries and is one of the top species selected by landscapers who promote indigenous trees. It grows up to 25 meters but is largely preferred because of its evergreen crown, conspicuous yellow flowers with long and brown pods that tend to spiral to a maximum length of one meter.



Hyphaene coriacea (**mkoma wa pwani**) a close relative of the doum palm (*H. compressa* or **mkoma**, on the right), but smaller and more confined to the beach and creeks, rarer inland. Photo BGF.



Millettia dura

Millettia (muhatia) is a deciduous tree growing to 15 meters and branching near the base that bears blue to lilac colored flowers. It is fast growing, drought resistant, coppices well and withstands pruning. It can be a great tree for landscape beautification but care should be taken as it can be highly invasive because of the tendency of seeds to burst out of their pods broadcasting themselves to unwanted places.

Podocarpus falcatus

Podo is an evergreen tree that can grow to 45 meters naturally and much smaller when introduced to a landscape. It has narrow dark green leaves that tend to taper. Its beautiful large and dense crown make it attractive and suitable for landscaping though it is relatively slow growing.

Polyscias kikuyuensis

This species (mutati) can be planted in gardens, driveways and avenues. It is tall, up to 25 meters and fast growing but unique with its straight, branchless bole up to over 10 meters with an umbrella shaped crown. It has large leaves composed of large leaflets, an attractive feature.

Spathodea campanulata

Dealt with in article on p.9.

Tabernaemontana stapfiana

Mwerere, or erendet, omobondo, and kunandere, is a beautiful tree up to 15 m bearing white flowers. It produces large grey-green fruits up to 20 cm in diameter (but normally less, closer to 8 cm) hence the name soccerball fruit. These can weigh several kilograms. In gardens, it prefers moist conditions.

Tamarindus indica

Tamarind, mkwaju in Swahili, is a large evergreen tree up to 30 meters, common at the Kenyan coast and growing well in the drylands. It is highly preferred for its edible fruit, large spreading crown providing shade, quality timber and now has found its way into roadsides, gardens and parks serving an ornamental purpose though most landscapers are still shying away from it because of its slow growth. Again, when properly treated and growing in a warm climate it can grow 60-80 cm a year. It is also known to make beautiful *bonsais*.

Terminalia brownii

Mbarao, muuku, grows to 15 m, but taller in the wild. It has an attractive crown sometimes layered and producing large white flowers. When planted for beautification, it is important to note that its inflorescence produces a foul smell at night, therefore, is best planted away from houses. It is drought- and termite-resistant.

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A row of Markhamia lutea (siala, lusiola, muu), eight-years-old, as avenue lining. Photo Jan Vandenabeele.



Millettia dura (muhatia) with lilac flowers coloured like those of Jacaranda (which is not an indigenous species, but comes from South America). Quite drought-resistant. Photo BGF.



Podocarpus falcatus (**podo, muthengera, olpiripiri, saptet**) a seven-year-old specimen. Photo Jan Vandenabeele.



Polyscias kikuyensis (**mutati**) an upland forest tree with a 5-9m straight trunk and then branching. Fast growing and makes a good silhouette standing alone. Photo BGF.



Tabernaemontana stapfiana (**mwerere, erendet, omobondo, kunandere**) a highly ornamental species with fragrant frangipani-like flowers. Found in moist forests, often where the vegetation was disturbed. Photo Jan Vandenabeele.



Terminalia brownii (**mbarao, muuku**) an attractive tree from relatively dry and hot areas, giving good shade and can grow to big dimensions. Photo Jan Vandenabeele.



Tamarindus indica (**mkwaju**) very useful shade tree (leaves, see photo on the right) that can stand dry and hot conditions. Photo Jan Vandenabeele.



Beautiful Ugandan trees

A list of 20 species, amongst many more

By GERALD EILU

Introduction

Trees are important elements in the landscape for enhancing quality of life. They improve the livability of our surroundings in numerous ways (Table 1). The choice of species for different functions is, however, sometimes complicated because the species have different characteristics. The exotic or introduced species are increasingly dominating our landscapes, but this should not be encouraged. This is partly because propagation materials are easy to find, they have the perceived or real visual appeal, and are often considered unique. In many places, trees are considered as simply ‘trees’ regardless of whether they are exotic or not. It is not easy for non-specialists to distinguish between exotic/introduced and indigenous/native species.

Table 1. Some benefits of trees in landscaping within our surroundings

ENVIRONMENTAL BENEFITS
Visual appeal
Improved air quality
Managing storm-water and erosion control
Stabilization of watersheds
Protection of wildlife habitats and promoting biodiversity
Lowering the wind speed
Helping young/new trees grow
Cooling effect
Land reclamation
ECONOMIC BENEFITS
Property values
Enhanced business performance
CULTURAL BENEFITS
Sense of place

This article provides some information on a selection of 20 indigenous/native tree species that may be used for landscaping within Uganda. The list was compiled by recording trees planted or retained in various places within the landscape of Kampala and on a road trip to North Eastern Uganda. It is not necessarily the case that they are the most beautiful trees, but they are among the most common species encountered within the landscapes. Prior to presentation of the species list, we should familiarize with the risks



Mvule trees planted by the colonial administrator in the centre of Dokolo town (Northern Uganda), hence now at least 60-70 years old. Photo BGF.

associated with trees in the landscapes.

Risks and challenges associated with trees in the landscape

Trees can be subject to negative criticism as people sometimes experience trees as a nuisance or as a cause of disputes between neighbors. Some of the complaints associated with trees include too much shade, too much leaf litter, low hanging and falling branches, dropping undesirable seeds, pods or fruits, droppings of birds and damage to buildings resulting from tree roots or falling trees.

Fortunately, many of these unfavorable occurrences can be averted. Damage to building foundations by tree roots, for example, results from improper sighting of trees relative to buildings. Hence, landscape designers should be aware of the growth characteristics of the species they plant.

Proper site and species matching is critical for tree planting in the landscape. It is important to understand soil types and the maintenance necessary to promote healthy root systems and to reduce the other circumstances that

would cause a tree to fall (disease, wood rot, a too-heavy crown, among others). Some of the critical characteristics of landscaping trees are discussed in the following section.

Desired characteristics of landscaping trees

The characteristics of landscaping trees discussed in this article include foliage colour, colourful flowers and fruits, growth and ability to tolerate harsh conditions.

Foliage colour and density: The colours can add interest and variety to a landscape during the entire growing season. Brilliant foliage colour is a desirable characteristic of landscape and ornamental trees. Some species have dense dark evergreen foliage, while others may have light multicoloured foliage. These is a whole range of shades of foliage that can be selected.

Colourful flowers and fruits: Some species of flowering trees produce abundant flowers before leafing. Other trees continue to provide colour and variety throughout the year. Another desired trait is trees that produce brightly coloured but not necessarily edible fruits.

Growth rate and size: Rapid growth is a desired characteristic of trees established in new developments so that the harshness of new construction is minimized quickly. In other situations, trees with relatively slow rate of growth may be required. Examples include small gardens where a fast-growing tree would quickly outgrow the available space.

Ability to tolerate harsh conditions: Landscaping trees are sometimes established under harsh environmental conditions. These include cities where there are high levels of air pollution, exposure to high levels of reflected heat, and limited open soil surface for air and water (or sometimes too much circulation of air). Species must be carefully selected to survive under these circumstances.

List of beautiful trees, their characteristics and their uses

The purpose of any landscape is to look pleasing



The borassus palm or mvumo in Swahili (Borassus aethiopum) can become a massive palm, with a bulge in its grey trunk. Slow to establish, but extremely handsome when there. Photo BGF.

to the eye. Some special uses of broad-leaved trees and shrubs in landscape design are as follows:

Choice of species based on foliage colour and density

Shade and road-side planting: One of the major purposes of landscaping trees is to provide shade. Many native or indigenous species characteristically have spreading crowns, dense foliage and provide excellent shade. Planting trees along roadsides provides shade. One of the famed species planted on the roadsides in Eastern Uganda during the colonial days is *Milicia excelsa* (Mvule). A few remnants of this magnificent tree survive to date. *Podocarpus* sp. has a dense evergreen crown and is common around homesteads.

Choice of species based on growth rate and size

Specimen and character plantings: These species have a shape or form that will be attractive to look at throughout the year. They can be used in a variety of situations such as characterizing a particular space. Palms such as *Borassus aethiopum* (African fan palm) are suitable for this purpose. The size of the tree must be in relative proportion to its surroundings.

Sense of place: Trees help to define a 'sense of place' and provide desirable landscapes. Their size and color can help to soften, for example, the often harsh urban landscapes. They can contribute to the 'sense of place' or unique characteristics that define our geographic communities. Species type, placement, and even long-standing individual trees can underscore regional history, culture, and identity. Trees encourage community interaction where



The incense tree or African Canary. Apart from its ornamental value, its seeds are edible and the tree is of medicinal use. Photo Gerald Eilu.

people tend to gather more when green spaces are available. Suitable species are mainly large and relict such as *Canarium schweinfurthii* (African canarium).

Choice of species based on ability to tolerate harsh conditions

Shelter, screen and buffer: Shelter plantings are designed to protect adjoining areas from effects of strong winds. They protect other plants, structures or buildings. Protection may be either overhead with overstorey plants or side protection. Trees may be used to screen unsightly areas such as garbage dump areas. Some of the characteristics include the tall, columnar form or the broad, spreading form in the case of *Canarium schweinfurthii*.

Managing storm-water, erosion control and stabilization of watersheds:

Storm-water runoff is an agent of soil erosion and pollution. Tree cover in the landscape reduces storm-water runoff preventing it from reaching watercourses. Storm-water runoff can be a big problem in urban environments resulting in flash floods and damage to properties. Trees can capture large amounts of rain through their root systems and canopies, helping to redirect rainwater into the ground water supply and ensuring that the top soil available for plant growth is not lost. The choices of species for these functions are numerous. It is worthwhile to plant the native or indigenous species that may have additional benefits. The species listed in Table 2 are generally suitable.

Air quality: trees help to improve air quality by reducing air pollution and greenhouse gases. The ability of trees to improve air quality depends on

species, location, and number of trees planted. The trees also release oxygen back into the atmosphere. Trees have a positive impact on skin cancer by providing shade from solar radiation. This function is performed by numerous tree species. Hence all the species listed in Table 2 and others are suitable.

Lowering the wind speed: strong winds often create dust-storms and may throw trees down causing enormous damage. Trees significantly reduce wind speed thus helping to reduce dust-storms. Deeply rooted species would be most suitable for this purpose. In the savanna areas where tree cover is sparse, species such as *Combretum molle* (velvet-leaved combretum), *Vitellaria paradoxa* (shea tree) and *Balanites aegyptiaca* (desert date) are appropriate.

Helping young/new urban trees grow: trees in urban areas face a difficult environment. Paved hardscapes limit access to rain water. The pavements do not provide what the trees need to grow. Thus, the urban conditions are harsh for tree growth. Older trees are beneficial in providing relatively favourable conditions for the newly planted trees. Trees used for this purpose are referred to as 'nurse' trees. These species should normally have sparse crowns. *Markhamia lutea* (Markhamia) is one example that is widely used on agricultural lands.

Cooling effect: trees reduce temperatures by shade and transpiring water. This is an effective tool in reducing urban heat islands and hot spots. Trees can also save local energy consumption through their moderation of the local climate. When placed strategically around buildings, trees can reduce cooling costs. By providing

Table 2. List of some beautiful tree species, their characteristics and possible uses

SPECIES NAME	FAMILY	Main characteristics	Possible use
<i>Albizia gummifera</i>	Fabaceae	-Sparse crown	-Nurse trees (nitrogen fixing)
<i>Albizia zygia</i>	Fabaceae	-Sparse crown	-Nurse trees (nitrogen fixing)
<i>Balanites aegyptiaca</i>	Simaroubaceae	-Light crown -Tolerant to relatively dry area	-Shade -Lowering wind speed:
<i>Borassus aethiopum</i>	Arecaceae	-Unique spindle-shape -Rounded crown	-Specimen and character trees
<i>Bridelia micrantha</i>	Euphorbiaceae	-Sparse crown, small size	-Visual appeal - Shade
<i>Canarium schweinfurthii</i>	Burseraceae	-Large spreading umbrella shaped crown -Straight cylindrical trunk -Fruits for birds and animals	-Specimen and character trees -Promoting biodiversity
<i>Combretum molle</i>	Combretaceae	-Sparse crown	-Shade -Wind break
<i>Cordia africana</i>	Boraginaceae	-Thick foliage and spreading crown	-Shade -Visual appeal
<i>Cordia millenii</i>	Boraginaceae	-Thick foliage and spreading crown	-Shade -Visual appeal
<i>Erythrina abyssinica</i>	Fabaceae	-Colorful bright red flowers -Tolerant to difficult conditions	-Visual appeal -Sense of place
<i>Ficus natalensis</i>	Moraceae	-Evergreen crown -Fruits for birds and animals	-Shade -Promoting biodiversity
<i>Markhamia lutea</i>	Bignoniaceae	-Colourful yellow flowers -Sparse crown -Relatively small size -Relatively fast growing	-Visual appeal -Air quality -Nurse species
<i>Milicia excelsa</i>	Moraceae	-Spreading crowns, dense foliage -Straight bole	-Shade and as roadside trees -Sense of place
<i>Podocarpus falcatus</i>	Podocarpaceae	-Evergreen leaves -Slow growth	-Visual appeal -Air quality
<i>Shiraklopsis elliptica</i> (syn. <i>Sapium ellipticum</i>)	Euphorbiaceae	-Dense crown	-Shade -Air quality
<i>Spathodea campanulata</i>	Bignoniaceae	-Colorful bright red flowers	-Visual appeal: -Air quality
<i>Syzygium guineense</i>	Myrtaceae	-Dense crown, evergreen leaves -Fruits for birds and animals	-Shade -Promoting biodiversity
<i>Tamarindus indica</i>	Fabaceae	-Dense, compact rounded crown -Stout bole -Tolerant to dry areas -Nitrogen fixing	-Shade -Lowering wind speed: - Land reclamation -Air quality
<i>Vitellaria paradoxa</i>	Sapotaceae	-Dense crown -Stout bole -Tolerant to relatively dry area	-Shade -Lowering wind speed -Air quality
<i>Warburgia ugandensis</i>	Carnellaceae	-Dense crown, evergreen leaves	-Shade -Air quality

shade, trees cool buildings during hot weather. Economically, this is beneficial as it can reduce the fuel costs associated with cooling. The species listed in Table 2 and several others may be used.

Land reclamation: tree planting can be a very valuable tool for reclaiming derelict land. Planting trees and shrubs can offer a cost-effective way to manage such properties on either a short- or long-term basis. The management of vacant property or neglected plots and other open spaces that place a high demand on law enforcement is promoted by planting trees. If left without trees, such sites may be abused for waste disposal. Various tree species can generally be used.

Choice of species based on colourful flowers and fruits

Visual appeal: the visual appeal and aesthetic impacts that trees offer are numerous; they provide a huge visual appeal to any area and can enhance the designs of landscapes. Species that are the most suitable usually have beautiful showy flowers or are evergreen. Some of the most suitable trees for this purpose include *Podocarpus* sp. (Podo), *Spathodea campanulata* (Nandi flame) and *Markhamia lutea*.

Wildlife habitats and promoting biodiversity: trees provide natural habitats for birds such as owls; small mammals such as squirrels and bats; numerous insects and other fauna. Trees provide habitats for other plants such as epiphytes, mistletoes, mosses and liverworts. The animals and plants would otherwise have a difficult time living in the cities. Species that provide fruits such as *Syzygium guineense* (Mzambarau), *Ficus natalensis* (Bark-cloth fig) and *Canarium schweinfurthii* may be used.

Property values

There is an increase in property value on tree-lined streets, proving that trees increase commercial and residential real estate value. This is mainly achieved through the aesthetic appeal.

Conclusion

The list of twenty tree species in this article is not exhaustive. More tree species in the tropical forests and woodlands of East Africa can perform similar functions. Research and sensitization efforts should be invested in measures to popularize the use of native/indigenous tree species in the landscapes.

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Vitellaria paradoxa, the shea tree that produces the famous oil. Photo Gerald Eilu.

The sausage tree (*Kigelia africana*)

Tree with African cultural significance and healing potential

By FRANCIS GACHATHI

Kigelia africana (syn. *K. aethiopum*), commonly known as the sausage tree, is a semi-deciduous tree with a rounded crown, growing to a height of 18 m on river banks but generally much shorter in the open woodlands with spreading low crown. It is easily recognized due to its spectacular sausage-shaped large fruits hanging from its branches. The bark is grey-brown in colour, smooth at first, rough and flaking in patches on older trees. The leaves are compound, in groups of three at the ends of the branches, usually with 5-11 very rough leaflets. The flowers are on long stalk, dark maroon with yellow veins on the outside, shaped like an upturned trumpet and with an unpleasant smell, most notable at night. They are pollinated by bats and hawk-moths which visit them for pollen and nectar. The unusual grey, sausage-shaped fruit that give the tree its common name (the sausage tree) hang from rope-like long stalks. They can reach over a metre in length and weigh as much as 10 kg. The fruit pulp within the thin skin is firm and very fibrous containing numerous hard seeds, released only when the fruit rots on the ground, the hanging stalks often remaining prominent on the tree.

The sausage tree is truly African. The generic name *Kigelia* comes from the Mozambican Bantu name for the sausage tree, "kigeli-keia" and *africana* means from Africa. The genus *Kigelia* has one species and occurs throughout tropical Africa from Eritrea and Chad south to South Africa, and west to Senegal and Namibia. It is classified under the flowering plants family Bignoniaceae which include trees with showy flowers such as the Nandi flame (*Spathodea campanulata*), *Jacaranda mimosifolia* and *Markhamia lutea* (siala, moo, kyoo, muu, lusiola).

In Kenya, the sausage tree has over twenty local names by which it is known, an indication of the tree's importance and value to communities throughout its geographic range. It occurs from the coast to the highlands in open woodland and riverine vegetation, 1-1850 m. Recorded local names include: Mobwoka (Giriama); Muatine (Kamba); Muratina (Kikuyu); Ratuinet (Kipsigis);



That's where the English name comes from: the sausage tree. Fruits can weigh up to 10kg.



Fruits prepared to make muratina.

Photos: Francis Gachathi

Kumufungu (Bukusu); Rotio (Marakwet); Murantina (Meru); Ratuinet (Nandi); Bogh (Orma); Mbwoka (Pokomo); Rotin (Pokot); Muun (Rendille); Imombi (Samburu); Bukuraal (Somali); Mwengea (Swahili); Mwaisina (Taita); Mukisha (Taveta); Muthigu (Tharaka) and Edot (Turkana).

The sausage tree is sacred to many communities in Africa. It is often protected on farm lands when other tree species are cut down. Among some communities, it is believed that hanging the fruit of *Kigelia* around dwellings will ward off evil spirits, violent storms, whirlwinds and lightning. The Luo and Luhya people bury a fruit to symbolize the body of a lost person

believed to be dead. Fruits are split into half longitudinally, the soft inner tissue and seeds cleaned out in hot water and used to ferment and flavour traditional beer. Fruits are eaten by several species of mammals, including baboons, bushpigs, giraffes, elephants, hippos, and porcupines. In traditional medicine, the fruit of *Kigelia* is used to treat a wide range of ailments, from rheumatism, snakebites, wounds, acne, sores, ulcers, boils, syphilis, fungal infections and measles. Today *Kigelia* is among several African trees with great marketing potential; a number of beauty and skin care products are prepared from the fruit extracts. The pale brown or yellowish wood is used to make stools, beehives, water troughs, mortars, various utensils and dugout canoes.

Because of its decorative flowers and amazing fruits, *Kigelia* is widely planted as an ornamental tree in urban areas in tropical regions. Planting sites should however be selected carefully, as the falling fruit can cause serious injury to unsuspecting people, and considerable damage to vehicles parked under the tree. It is a suitable tree for planting along riverbanks.

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Informal nurseries in Nairobi

More important than you think

By JOHN BOSCO MUKUNDI AND WARIARA KARIUKI

Introduction

Greenery in urban areas is beneficial in ways such as climate modification, creation of natural environments and beautification of streetscapes and residential areas. Plants, apart from providing environmental benefits, contribute to the economy of communities. For example shoppers were found to respond positively to trees in downtown business districts of various cities in the US (Wolf, 2005). In different countries different bodies are in charge of urban tree planting. An integrated form of urban forest management is well advanced in developed countries such as North America but lacking in developing countries. Onganga, (1992) reports that the major challenge facing urban forestry in developing countries is institutional rather than technological in character. Some of the major players involved in urban greenery in most developing countries such as Kenya include state departments such as forestry and agriculture, municipal councils, NGOs, academic institutions, organized local groups and individuals. One of the emerging important key players in developing countries is individual plant nurseries located mainly along major road networks. Recently there has been a proliferation of individual plant nurseries within most urban centers in Kenya. Similar trend has been reported by Mateen, (2003) for the Indian city of Karachi. In America, the nursery and landscape industry includes thousands of small family businesses that grow, retail, install, and care for plants and landscapes that together employ approximately 500,000 workers during peak seasons. It is further reported that cash receipts from nursery and greenhouse sales are increasing at approximately \$500 million per year of which woody landscape plant products account for 57.5% of the value (USDA, 2002).

Like other businesses, operations of private plant nurseries in the city of Nairobi are guided by regulations, in this case, set by the department of environment. They include a land size limit of 20*20 m on any reserve area, proof of access to clean water, non-excavation of soil on site and maintenance of waste-free premises. In addition, there are requirements on manner of plant display and maximum height of maintenance of 3 m for aesthetic and security reasons. Operators must also undertake to prevent and control diseases and pests using conventional



Truly roadside. It helps that the road is busy and leads to an up-market neighbourhood. All photos Miti Kenya.

methods and maintain an up-to-date inventory of stocks to facilitate inspection and monitoring by the department. The goal of this study was to promote good nursery business practice by enhancing regulatory measures that promote utilization of available horticultural technologies, enhance the urban environment and improve overall household income levels from plant sales. We sought to establish characteristics of private plant nurseries, the status of technical know-how, income levels, role of collaborators and identify challenges facing plant nursery operators against the requirement to comply with set regulations.

Materials and methods

The study area covered almost all sections of the city of Nairobi, Kenya, especially the major arterial roads. Nurseries visited during this study were grouped into 5 locations; the central business district (CBD) that is characterized with built up areas (A), the northern side of the city (B) which is relatively cool and covering parts of Karura forest, the southern side (C) which is drier with a more open landscape and where the main airport is located, eastern side (D) is a mix of cool

and dry areas and the western side (E) which extends to the woodlands of Ngong forest.

In each visit a questionnaire was administered to the nursery operator through a step by step discussion. This method was found necessary in order to capture the information sought without arousing undue suspicion of being inspectors from the owners. Key issues addressed in the questionnaire included size of nursery, licensing status, main types of plants grown, most valued plants, difficult plants to propagate, type and source of propagation media, source of planting materials, type and source of water, type and level of buying by different clientele, number and gender of nursery personnel; challenges faced such as in plant diseases, propagation, labour, marketing, competition and lack of space. Information on type and level of training was recorded as well as the type of support most needed. In some localities more than one nursery owner were present and therefore we interviewed two persons per every four other nurseries within such an area. Information from respondents was analyzed and interpreted from descriptive statistics. Mean score values and

mean differences were used to account for the results. Locations of the private plant nurseries were overlaid onto map data of Nairobi city, for land cover type, population density and road network to find out whether there were any correlations in distribution.

Results and discussions

More than 30 private plant nurseries were visited during the study. About 90% of the nurseries were located within 20 km radius from the CBD (Figure 1). Individual nurseries ranged in size from 300 m² to 2500 m². Although the city council regulations has set space occupancy to be about 400 m², more than 96% of the surveyed plant nurseries occupied a larger area. Further, of all the nurseries surveyed only 40% have or have ever applied for license. Information from the city council indicates that only about 5% of them were licensed for temporary operation in the year of 2005. About 76% of the operators obtained horticultural skills for production and management informally. Plant types produced were very similar between different nurseries and they ranged from trees and shrubs to indoor foliage plants, groundcovers and bedding plants, both exotic and indigenous. However, individual nurseries differed in the quality of plants produced depending on geographical location. Most common nursery tree seedlings included *Podocarpus falcatus* (podo), *Prunus africana* (red stinkwood), *Newtonia buchananii* (mukui), *Spathodea campanulata* (nandi flame), *Grevillea robusta*, *Callistemon citrinus* (bottlebrush tree) and *Tipuana tipu* (tipu tree). Common shrub plants were *Bougainvillea glabra*, *Lantana camara*, *Hibiscus rosa-sinensis*, *Rosa*

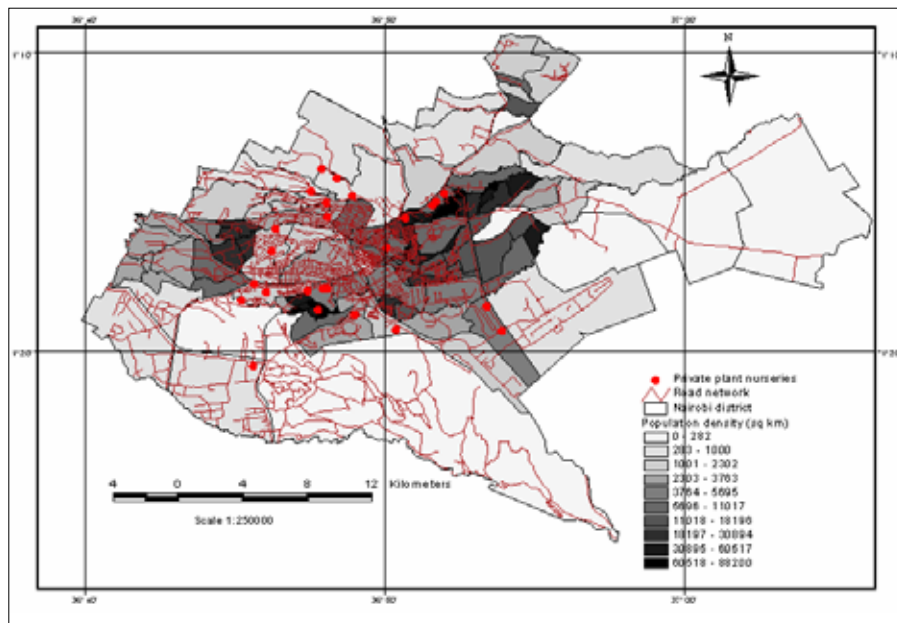


Figure 1. The distribution of private plant nurseries against population density and road network within Nairobi City.

spp, *Duranta* spp, *Dovyalis caffra* (kei apple) and *Thevetia peruviana* (yellow oleander). Some of the food crops found included fruit tree seedlings such as *Mangifera indica* (mango), *Citrus sinensis* (lemon or orange trees), *Persea americana* (avocado) and vegetable crops such as *Brassica oleracea* (kale), *Spinacia oleracea* (spinach) and *Solanum villosum* (mnavu, osuga, namaska, managu). Plants listed as difficult to propagate by most nurseries included *Olea capensis* (Elgon teak), *Araucaria heterophylla*, *Cycad* and *Palmae* family plants.

Inputs such as soil, manure and planting materials were largely sourced from hawking

vendors. The top red soil excavated from the wild and from construction sites was the most commonly used type of soil while manure was solely farmyard or from composting. Planting material in form of cuttings or seeds was all obtained from un-classified sources such as own nursery, neighbours and friends or any vendor who came by at the time of need. This practice could have major influence on propagation success and plant quality. Only 60% of the nurseries use relatively clean water from streams or ponds and tap while about 40% depend on wastewater runoff from industries, sewerage and auto-garages for irrigating their plants, against the set council regulations. Usage of polluted water could affect plant health negatively and also human health as some nurseries are also engaged in growing food crops for human consumption. About 68% of the nursery operators rated individual buyers as their main clients constituting 80-100% of their total sales and not large companies or institutions.

The city council constituted the lowest percentage as a buyer, being rated by 56% of the nurseries at 0-20% of total sales. Aspects that scored low included quality of soil and water, marketing to companies and institutions both public or private, lack of formal or skilled training for operators and production challenges such as unavailability of suitable planting material, low plant establishment rates, limited market outlets, high competition between nurseries and low prices for produce leading to low incomes. 84% of the respondents earned between 5 and 11 dollars per day, the peak being during the rainy season of April to June.



Well established roadside nurseries don't only deal with plants but also with inputs like pots etc.

From further analysis it is evident that most operators in the southern side of the city use low quality water as compared to those in the eastern, northern and CBD parts of the city. Companies were rated significantly low as a client especially by operators in the southern and northern sides of the city. Challenges related to seed germination and marketing were significantly higher in the southern, eastern and western parts of the city as compared to the northern side and the CBD.

Despite the challenges, more than 96% of respondents operated the nursery business as a full time occupation and relied on it for their socio-economic needs. When queried on type of support they would need, most owners reported financial and marketing support would boost their business while on training, the majority preferred short term as opposed to a long term training course. Although many organizations and government departments are involved in nursery plant production and urban forestry, almost all the private plant nursery owners reported on the negative about any linkage with such bodies. However, a group of plant nursery owners near Gigiri in Muthaiga reported collaborating with the forestry department in reverting illegally occupied forestland into plant production activity. Spatially, most nurseries were distributed along the major arterial roads and in urbanized area of the city where also population density is high (Figure 1). This can be attributed to the principle of the city council allowing usage of road reserves and other public open spaces for plant production. This could in the long run save the council maintenance costs while achieving its greenery and city beautification objectives.

Conclusions

As people become more concerned about their surrounding environment, the current growth momentum of private plant nurseries being witnessed within Nairobi city may continue. The following regulations were rarely adhered to; land size limit of 20 *20 m, usage of clean water, dumping on site, proper plant display, maintenance of plant height below 3 meters and maintenance of up-to-date inventory of stocks. Failure to adhere to the regulations resulted in most nurseries not having licenses and thus operating illegally. In order to enhance positive impacts from the private plant nurseries, the current regulations should address the realities like need of larger nursery units and the requirement for some level of formal training in horticultural and management skills. Although a high percentage of the operators have up to elementary education and informal training in horticultural aspects, the majority, especially



It might look disorganised, but sure it makes money. Different species of succulents in the foreground.



Logistics! The plant to be transported is a bamboo. It will recover quickly.

the young, value the need of undergoing formal training to improve their skills and be recognized through a certificate. A trained private plant nursery operator would better understand, appreciate and adhere to the regulations. In order to boost the appearance and marketability of private plant nurseries, the regulations should also provide for a standard layout requirement of a plant nursery as envisaged by the city council. Though scanty, information from the city council's department of environment shows that there is rapid increase in number of private plant nurseries. This is being encouraged by the 'green

your city' initiative of the city council of Nairobi, and as a way of beautifying the city, which has had serious problems of dumping and illegal constructions.

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Roadside nurseries; beautifying landscapes, making money

Some of the secrets of a good businessman

By McRAE MUTHOMI

Over the past decades, the roadside nursery business in Kenya has grown from small nurseries with a few exotic species, largely composed of flowers and ornamental trees, shrubs and herbs, to big nurseries with hundreds of thousands of seedlings; both exotic and indigenous. Since the early 1990's, competition, demand and trends in prices for both exotic and indigenous species in the market have taken a dramatic turn. Peter Kariuki, owner of Muthaiga Plants Nurseries Ltd. recounts this transition when 24 years ago he got his first job as a florist, then ventured into own roadside nursery which has grown tremendously. In March 1991, Peter recalls buying a roadside nursery with about 10,000 seedlings from a friend who had given up on it, for Ksh 7,000 (actual worth 83,000 Ksh with an average yearly inflation of 10%). In a span of five days after purchasing the nursery, he recalls making Ksh 40,000 (worth now 477,000 Ksh); this became the game changer. In those days, his nursery was largely composed of flowers whose demand came from the high-income households in the rich suburbs of the City. He downright stopped working as a florist and quit his transport business to focus on his roadside nursery. Four years after, (1995) he recalls making Ksh 200,000 in a single day from sales. He was not going to turn back any more; he had to expand this business.

Now he runs his company from the Nairobi Central Business District offering services like landscaping for homesteads and public spaces, and also supply and maintenance of office plants. Presently, his nurseries have a capacity of over 420,000 seedlings, both exotic and indigenous trees, shrubs, herbs and grasses. His largest roadside nursery is on a $\frac{3}{4}$ acre of land along Limuru road and has a capacity of over 300,000 seedlings. His company has been contracted in a Nairobi beautification project but also does around-the-compound landscaping for private



Peter Kariuki, rightly proud of his accomplishments as a businessman. All photos Miti Kenya.

houses in blue-collar residential estates.

In monetary terms, nurseries such as his, generate income ranging from Ksh 300, 000- Ksh 400,000 per month during the rainy season when market for products is at its peak and 100,000 – 150,000 per month during the dry seasons. "I do this as a hobby, it's my passion." Peter explains what drives him. Not surprisingly, exotic trees, shrubs and flowers make most of the money, "Not many people buy indigenous plants probably because they want something unique, not something they are used to seeing." He explains why he thinks the market prefers exotic plants over native plants. He also explains that for his business, he needs fast-growing species which make money faster; "Native species such as *Podocarpus falcatus* (Podo), *Warburgia ugandensis* (muthiga), *Vitex keniensis* (Meru oak), native figs among others take long to germinate and mature for sale yet their market price is not as attractive as for most of their exotic companions." He explains. Prices for flowers though have gone down since the early

90's and to balance this, a nursery operator must have huge numbers in stock in order to make substantial amount of income from them.

His workforce is comprised of five employees and casuals who assist in tasks such as pot filling, loading and off-loading of inputs from trucks among others. For his business to thrive, the supply of seeds and seedlings is intensive. Occasionally, it involves traveling over 480 kilometers to the Kenyan Coast to acquire rare species such as the *Cycads* and palm seedlings (e.g. *Hyophorbe lagenicaulis* (bottle palm), *Dypsis lutescens* (golden palm) and *Roystonea regia* (royal palm). These are the pivotal species for profit on his nursery - buying price at the coast per seedling ranges above Ksh 500 per seedling but in Nairobi, these fetch from Ksh 1,000 to Ksh 40,000 per seedling depending on size and age especially the *Cycads* and Bottle palms. *Cycads* always fetch a minimum of Ksh. 5,000 and a maximum of 40,000 per seedling. Ornamental Cypress species which are highest in demand also provide a good fetch for the pocket selling



A well-diversified choice in species: an orchid in the centre.



A potted Cycad: good business!

at Ksh 700 per piece depending on size and age.

Sometimes his logistical expenses per trip are up to Ksh 30,000 when he has to acquire seedlings from Mombasa though, the returns far overshadow the expenses. Other species including herbs and grasses can fetch as low as Ksh. 20 a piece. He also travels to Embu and Meru Counties for seedlings. His other market that keeps demand and supply in balance, is his landscaping business that demands bulk supply of seedlings. Apart from this, he also supplies his products to other landscaping companies.

For additional income, Peter has a stock of about 800 clay pots in their various sizes that he sells to customers for plants that need potting. Prices range from Ksh 200 to Ksh 7,000 according to the size. These make over 50% profit of the buying price.

Cost of maintaining the nursery

A fee of Ksh 3,000 per month is paid to the Kenya Forest Service (KFS) and an additional Ksh. 100 per day is paid to the City Council. He does not buy water because his nurseries are sited next to a river, his only water expense is in buying fuel for an electric pump that is used whenever watering is needed, the water itself is free. Red soil from construction sites is bought for Ksh 6,000 - Ksh 8,000 per eight tonnes. For the nurseries, he buys 14 tonnes of manure from Narok and Mai Mahiu areas for Ksh 70,000. Other costs include salaries and wages for employees and casuals, and purchase of seeds, seedlings and clay pots.

Challenges

The plastic ban effected this year in Kenya does not restrict nursery operators from using



Manure, not only for own use but also for sale.

plastic bags but this has another unexpected implication. Production of plastic bags in Kenya has depreciated and this has had an impact on the prices. Prices of polybags now has gone up by over 100%; for example, 5x10 inch polybags were selling at 50 cents a piece; now the same are selling at Ksh. 1.50. This means that prices for seedlings will be adjusted.

Roadside nurseries also face the challenge of eviction due to road expansion projects and land grabbing incidences that are on the rise.

Conclusion

Certainly, operating a roadside nursery has its cons and pros and it is evident that it's an enterprise that potentially can improve livelihoods, boost economic growth, promote conservation and add aesthetic value to our surrounding. Current trends in growth of this sector indicate a very stiff rise in competition for space, water and supply. Although this can be seen as unfavorable to small-scale nursery operators, it reveals that the rise in demand for forest products offered at the roadside nurseries is an indicator that a vast majority of city dwellers are realizing the importance of forests, not only for timber and fuel, but also for landscape beautification.



The golden palm (*Dypsis lutescens*) and ornamental cypresses. Moneymakers.

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Successful company in landscaping

A forester's perspective

By DIANA AHEBWE

Introduction

Mrs. Kabatengare is a professional forester/landscaper with a Bachelor's degree in forestry and a Master's degree in Agribusiness from Makerere University. While pursuing her Bachelor's degree in forestry, she was taught a course unit in ornamental forestry with an aspect of landscaping. "The lecturer was good because it is that knowledge that helped me start landscaping as a profession as well as start my own business." says Mrs. Kabatengare. With this background, she looked at landscaping as the most viable business and she registered a company (Africa Trends Limited) in 2006, which has since been growing in terms of clientele.

Do you carry out training for your workers?

Currently I train workers although they are not directly working under my authority since I am more into consultancy, unlike in the beginning when I used to do the work myself. Now clients get their own workers or I recommend workers trained by me to do the work. The workers are trained on soil mixing, planting and vegetation maintenance. For one to achieve a landscape with all fronts of beauty, functionality and sustainability, the following must be addressed: proper drainage and channeling of excess water, smart demarcation of parking lots, lawns and flower pockets plus reading nooks, proper lighting as well as plant selection to embrace texture and structure.

Which kind of projects do you get?

I deal with both commercial and domestic projects but major on domestic because the majority of people are building residential houses and require the services of a landscaper. Commercial projects include hospitals, offices, schools, hotels etc. These are demand-driven because the owners have understood the value of professional landscaping unlike domestic projects where few people value the profession of landscaping because they think they can plant the trees or grass and design by themselves, and therefore think paying for a consultancy is costly.



Landscaping of a Kampala garden. Note the Italian Cypress with its columnar shape. All photos Grace Kabatengare.



Use of palm trees in landscaping.

The average size of the projects I work on is 25 decimals¹ for domestic, especially those with small plots in Kampala; those outside Kampala

¹ One decimal is 40.46m², hence 25 decimals equals about 1,000m² or a quarter acre, and 45 decimals about 1,800m² or 0.45 acres. One acre is 4,000m².

can take 45 decimals of the landscape. While those with bigger land especially commercial projects, the landscape can take one acre.

What is the vegetation component in relation to the rest?

My emphasis in landscaping, is that at least 25% of the landscape ought to be green and this includes trees, shrubs, grass etc. My advice to clients is to leave at least a meter from the boundary for tree planting then utilize the boundary to plant shrubs. Being a forester, I emphasize the planting of mainly multipurpose trees such as medicinal and fruit trees, other than just planting trees for beautification.

How is the market for landscaping?

Landscaping has great market potential because people are building, yet there are very few professional landscapers to cover the whole country; we cannot circulate the whole market. The challenge is that people are not sensitized about professional landscaping hence don't value the knowledge, skills as well as landscaping as a profession, but if people become aware then the market is immense.

Who are your clients?

Most clients are in Kampala and most of them come for our services through recommendations from previous clients. I have also worked on a few up-country projects like Mbarara, Rukungiri and Kabaale districts. The procedure for offering my services is to meet the client first, agree on the fee, visit the site, write a report which will help the client to implement, then offer proper recommendations and instructions. If the client prefers that I do the implementation, I prepare the budgets; all expenses for acquiring the materials are incurred by the client. If the client has his own taskforce, then I will train them and show them what to do.

What tree species do you usually use?

I cannot do landscaping without trees and this is not only for beauty but multipurpose, for example, fruit trees such as soursop (*Annona muricata*), grafted mangoes, citrus fruits, avocado, guavas, and ornamentals such as *Podocarpus* spp, Italian Cypress (*Cupressus sempervirens*) as well as shrubs. I avoid trees that need a lot of maintenance especially if the client is not interested in maintaining them. For instance *Terminalia* spp would need pruning. It is only advisable for people with bigger land where it can be planted 20 meters away from the house because of its root system, and it drops a lot of leaves.

Where do you get the seedlings from?

I used to have a nursery that I used to run it myself. For now, I propagate a few seedlings such as fruit trees e.g soursop. Most of the seedlings are bought from Kawanda, especially grafted fruits because I trust the source and in case the trees don't bear fruit when they are supposed to bear then, I get a replacement, while other tree seedlings are bought from the National Tree Seed Center. The source of the seedlings matters; therefore, I recommend authentic nurseries for the seedlings.

What has made you successful in business?

The quality of work that I do has brought me more clients who do the marketing for me by recommending me to other people. I also have professional knowledge in landscaping and I love what I do. This has made me successful. I also work closely with landscape architects who help me bring out quality work with both proper drainage and lighting. The professional fee I charge depends on the project area and this includes the site visit, architectural design, a proposal with details of what should be done, which seedlings to plant, source of seedlings,



Young palm trees alongside a drive way.



Young Terminalia tree planted some distance away from the house.

materials to be used, source of labour, quantities, plus the bills of quantities and recommendations. I also do a follow up on my clients and get feedback from them which helps me improve my work.

The challenge is that people do not fully appreciate professional landscapers so they are not able to pay for the services. This attitude is changing slowly. However, there's a great potential in landscaping because people are building and also some private institutions have come up to train and teach landscaping. I would also like to start training other people so that the industry can grow. We need to mentor other young people who can replace us.

What advice do you give to anyone willing to start the business of landscaping?

Start professionally e.g. get the necessary

training because with only a course unit I was able to acquire knowledge that has brought me this far. Register a company in order to get serious clients in order to do the business legally. One is required to do due diligence and study the market as well as your target group before joining the business. The aspiring landscapers should get mentors to walk with them at the start, because if it weren't for my mentor, I would have taken much longer to get established and become confident.

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The Cape chestnut tree

More than only ornamental

By JANE GITAU

Roselyn Maundu is making a cottage industry called “Jossy Beauty” centred on the hidden natural goodness of botanical oils from Cape chestnut to Avocado oil and many more. The natural oils from the trees have contributed to managing her years of acne. She spoke to **Miti** about her struggle with acne, the passion she developed for the oils and the business she decided to set up around it.



Cape Chestnut in flowers. The tree is common in dry upland forest, like around Nairobi. Photo Jan Vanderabeele

1. Can you give me a quick overview of life before Jossy Beauty?

As a woman my life has been preoccupied with beauty and health so it was no surprise that eighteen years ago I started my beauty products journey.

I worked in 3 East African countries – Kenya, Uganda and Tanzania, so I am a true East African. Then I set on my journey as a young entrepreneur. I imported and distributed international lines of

cosmetics, crèmes, and lotions, but in the back of my mind I always had the desire to set-up a business that focused more on locally available raw materials. I grew up in Machakos and studied marketing at university and then worked in the beauty industry for 15 years.

2. What is the philosophy behind Jossy?

At Jossy, we feel that it is our responsibility to share options for lasting health and wellness.



Yangu Oil for cosmetics. Photo Miti Kenya

We do not compromise on exquisite skin care. That's why we are so excited about all the recent scientific studies emerging around the effectiveness of 100% pure and cold pressed oil in promoting healthy skin and hair. All our oils are export quality and are cold pressed to preserve all the nurturing goodness of natural oils.

3. Did you have any life-changing experiences that motivated the establishment of Jossy Beauty?

I had acne for many years. The skin would just pop open in the most unexpected of places including at meetings. There was nothing I left out that was said to be a cure, I listened to and tried every old wives' tale.

In my opinion, some treatments recommended for acne are very harsh, even when the skin is already delicate.

As I went about my daily affairs, I started to seek a natural solution to manage acne and other common skin conditions. Then I started researching and using the natural oils and selling to others. Gradually, I started seeing the remarkable improvement on break-outs and the scars started to fade and voila! My life-long search had yielded fruit. Then friends started using and recommending the oils to other people with skin issues and I realised indeed the oils I had were working.

When I started healing from acne, I read over and over again the ingredients of the healing oils. I discovered to my pleasant surprise that they were all locally available. I also realised that the big players in the industry used minimal quantities of the oils and charged an arm and a leg for them. Making them available in the whole state was so much cheaper. For instance, 120ml of Yangu oil is available from Jossy at only 400 shillings while half of that imported and mixed with many other non-essential things costs 2100 shillings.

4. What trees do you use in your work? Where is your office?

We use Baobab (*Adansonia digitata*), Cape chestnut (*Calodendrum capense*), Jojoba (*Simmondsia chinensis*), Chia (*Salvia hispanica*), Marula (*Sclerocarya birrea*), Moringa (*Moringa oleifera*), Papaya (*Carica papaya*), Avocado (*Persea americana*) and Shea (*Vitellaria paradoxa*) to make our natural oils. All these are locally available but unfortunately, as a people, we lack knowledge of their richness. We operate from Mombasa Road in Nairobi.

5. Tell us about Cape chestnut.

The tree is known scientifically as *Calodendrum capense*. It has an abundant flower display and can grow up to 20 metres high in a forest. It has a spreading canopy, a smooth grey trunk and the leaves are ovate up to 22 cm long and 10 cm wide. The large pink flowers are produced in terminal panicles and cover the tree canopy in season.

Its oil, popularly known as Yangu oil, is obtained from the seeds and is used in skin care. It has ultraviolet protection, high content of essential fatty acids and antioxidants and has a mild odour making it a natural for cosmetics. The seeds are also eaten by birds and monkeys.

It grows naturally in eastern Africa from the equatorial highlands of Kenya through to Tanzania on both sides of Lake Malawi, to Zimbabwe, and then along the lower slopes of the Drakensberg Mountains of South Africa and into the coastal forests from Port Elizabeth to Cape Town.



The black seeds and the chestnut-like fruit capsules of the Cape chestnut. Yangu oil is pressed from the seeds. Photo Francis Gachathi.

6. What would you say most motivates you in your work?

I discovered and I want to offer to other people the luxurious, chemical-free skincare from mother-nature with love. While the rest of the world calls these oils rare, luxurious, indulgent, we call it our birth-right.

Often the highest percentage of a beauty care product is ‘aqua’ (otherwise known of as common water), bound together with industrial compounds and preserved with synthetic chemicals. The miracle oils they advertise are often a very small part of the final product.

7. What are the personal goals you most want to accomplish in your work?

Changing the skincare narrative. It is a daily part of life for everyone. I want to be a thought leader in skin care. People need information to move from where they are to where they ought to be; to move between what they see and need. For me it has been a journey of discovery and I can now confidently say if it is not natural, leave it.

8. How many people does Jossy employ? In how many branches/ outlets?

We are an online shop. We are discussing with supermarkets and beauty shops the possibility of stocking with them so those who find online challenging can find them physically.

With hundreds of known and documented skin conditions, skin and beauty is one of the biggest commercial industries with an estimated market of \$121 billion dollars worldwide. As with any global market of this size, much of

the industry is controlled by large, multinational corporations. At Jossy, we plan to have a chip of the pie and offer natural as opposed to chemicalised.

9. Were there any key turning points in this project?

Yes. Unfortunately, between March 2015 and March 2016, I was bed-ridden due to illness. I was numb on one side, I could not drive. Then in July 2015, my husband perished in a road crash. I left his funeral and went straight to hospital and while lying on that bed, I thought to myself, I could just lie here and die.

10. What were the key relationships that mattered most?

“I have spent many days stringing and unstringing my instrument while the song I came to sing remains unsung.”

I had discussed the possibility of starting this line with my late husband. In fact it was the last conversation we had. Then there was Jossie our daughter. She was the only constant I had at that time. I created Jossy the brand on that hospital bed, named after our daughter. It is an expression of my desire to manufacture locally using the rich goodness of our greatly endowed natural materials and my passion for all things natural especially around skincare.

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Muguka, a blessing or a curse

But it is there, anyway

By JAN VANDENABEELE

Miraa, or khat, from the bush *Catha edulis*, doesn't really require an introduction for Kenyans. Even Scandinavians should know it, as it is the drug of preference of Somalis, of which important diaspora communities exist in Northern and Western Europe.

Also known by the trade name Somali tea, there is quite some varieties known to insiders. The best one is called "Giza", from bushes cultivated in Nyambene, the heart of Kenyan production, with a street value of 16,000Ksh per kg, hence reserved for rich people only. The perception of its quality seems to be linked by the speed it renders you "high". Other varieties are "kangeta", "allele", "Chyulu" (from the name-sake hills), "murengene" and so on. And of course, "muguka", with accent on the "a", from Embu County. This is only talking about Kenya, while the plant is also indigenous to Eastern Uganda, Ethiopia and is being grown in the southern part of the Arabian Peninsula. No doubt more varieties exist.

"Muguka" originates from the rocky and relatively dry hill tops like around Siakago, in Mbeere Constituency of Embu County. It is said to have always been there, and used to be consumed by the elders on peaceful evenings, not really being commercial. It is different in some aspects from the commonly known miraa from Nyambene in Meru County. Firstly, it is decidedly more drought resistant. Secondly, the part to be consumed is the tender leaves, and not the phloem tissue or bark from the young twigs. Thirdly, the Embu variety gets faster to maturity, with harvesting starting after barely 18 months, while the Meru one has to grow into a small tree, some 3-4m high, harvestable after 4-6 years, with full production by 8-10 years. The shelf-life of muguka is shorter and hence it cannot be exported because that would take more time; or at least so I'm told.

Growing the stuff

On the land that I'm visiting now, at the shores of Lake Gitaru, in Seven Forks and on the farm



This is not a neglected tea plantation but a well-maintained field of muguka in Embu county. All photos BGF.

of Sammy Mukui, I only see small bushes, of maximum 1.5m high. They look a bit like tea bushes. And indeed I'm explained their management is similar to that of tea, and the harvesting of the top leaves very much the same. Sammy has at least 2 acres of muguka under cultivation, and is visibly doing well.

Data on Sammy Mukui's farm

Gichiche Sub-Location, Mavuria Ward, Mbeere South	
Altitude masl	930
Yearly rainfall mm	approx 750
Soils	red sandy loam, stony, >75% sand
Planted	2012

After some more clarifications about the management, harvesting and marketing of muguka, it becomes unmistakable that no other crop can beat this one for income generation. Growing it is not a problem. It is easy to propagate, establish and relatively simple to harvest, though the pruning seems complicated. The fact that the soil is stony is considered a plus, it would grow less in good soils. The biggest

bottleneck definitely is irrigation; all these little leaves need water to sprout and grow, which they do with a lot of vigour during the rainy season, but distinctly less so during the longer dry spells. Consequently, supplies are lower during the dry season, and prices much higher, as consumption never stops. Labour inputs are relatively high, for irrigating, pruning, weeding, picking and occasionally fertilizing and spraying with an insecticide.

Market and some economics

The market for muguka is huge, and expanding. People appreciate the fact that muguka is cheaper than miraa proper, and they go for it. With as little as Ksh. 50, the consumer is guaranteed to get 'high' thus this is more affordable than miraa. The bitter taste is buffered by mixing with chewing gum, or peanuts, cashew nuts, or even soft drinks. Sammy acts as a part-time consultant for farmers who want to start growing muguka. Figures from Embu County I didn't find, but a study from Meru County¹ in

¹ Sabina N. Baariu, Galcano C. Mulaku, 2015. Mapping Khat (Miraa) by Remote Sensing in Meru County, Kenya. International Journal of Remote Sensing Applications (IJRSA) Volume 5, 2015.



Where the picking takes place, at the top of young twigs



What is picked and goes to the market.

2015 found out that 70,000ha of miraa existed; a significant acreage. In Embu, the area under cultivation is definitely smaller than in Meru, but it is increasing; and establishment of the crop is easy, root suckers and cuttings can be used and are easy to produce.

Sammy explains that buyers are very eager and frequently come to his farm to harvest. Picking is possible almost every week, and after every 5 days during the rainy season. It helps that he has a big block of one acre under production, there's economies of scale. The leaves are picked (manually) at night like from 10pm to 4am, and then loaded into a vehicle to be transported very early in the morning so that the leaves arrive fresh in the market. They are immediately sold, before they start wilting and losing their moisture content. Proboxes and pick-ups currently are not stopped for the customary "cess" by county officials, according to Sammy. They drive to the major local centers, to Nairobi, and to places as far as Garissa and the Coast.

Income from one acre under irrigation, during the dry season easily reaches 350,000 Ksh per

month (and even more, see box), while during the rainy season it makes 70-80,000Ksh. No other crop in these conditions can beat this².

Farmers however seem to appreciate a variety of crops, not wanting to put all their eggs in the same basket, and muguka is seen growing alongside butternuts, watermelons and mango trees. A nice detail is that goats also like to chew muguka (see photo).

Socio-economic effects

Barely a kilometer away from Sammy's farm, we meet Elisabeth Muthoni, mother of 3 children, also possessing a field at the shores of Lake Gitaru. Among other crops, she grows 250 stems of muguka, and welcomes the money it makes. She is however clear that she will never consume it herself, and will also discourage her children from doing so.

² The similarity with coca (from which cocaine is extracted) is striking. Both are culturally accepted crops with long historical roots, where chewing leaves is a widely accepted habit by the local population. (In the case of coca, the leaves are even processed into tea bags called "mate de coca" in Peru.) Both crops are hardy and easy to cultivate, and make more money than anything else. But there the similarity stops. Fortunately.

Although described in literature as a mild, non-addictive drug, Elisabeth says that a couple of years of continuous consumption, like three years, does result into addiction. The positive effects, like induction of euphoria and alertness and general good feeling, are being off-set by insomnia, lack of sexual performance (for men), loss of appetite, mouth sores & blisters by frequent chewing and lack of concentration. Addicts also look filthy, as they forget about personal hygiene. Society is affected because of school drop-outs; young boys that stay out of class because of night work (picking the leaves) or trading in muguka. As such, muguka promotes illiteracy. Sure enough, Elisabeth emphasizes that quite some people refuse to grow muguka, out of principle, often religiously motivated.

Equally sure is that many small centers in Mbeere, like Kiritiri, Munadhiri, Mecca, Gachoka and Muraru are booming, and that the money is flowing there.

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Gross income from one acre of muguka in lower Embu (Mbeere)

Item	quantity	Note
spacing in the row (ft)	4	planting distance
spacing between the rows (ft)	5	planting distance
# per acre	2,000	taking into account 10% mortality
Bushes/basin* dry season	20	# of muguka bushes whose leaves make up for one basin
bushes/basin* rainy season	10	# of muguka bushes whose leaves make up for one basin
price/basin dry season (Ksh)	2,200	range of 2,000-3,000 Ksh
price/basin rainy season (Ksh)	150	range of 100-200 Ksh
income/harvest rainy season (Ksh)	30,000	one picking only
income/harvest dry season (Ksh)	220,000	one picking only
length of rainy season (weeks)	12	4 months (Apr, May, Nov, Dec)
# of harvests rainy season	12	at one picking per week
length of dry season (weeks)	40	52 weeks minus 12 dry ones
# of harvests dry season	20	one picking each 2 weeks (?)
total yearly income (Ksh)	4,760,000	for one acre
average monthly income (Ksh)	396,667	for one acre

Source: adapted from Sammy Mukui, 9th Nov 2017

* a basin is the unit of measurement while harvesting the leaves.



Elisabeth Muthoni and two of her children.

Agroforestry in the Mt. Elgon sub-region

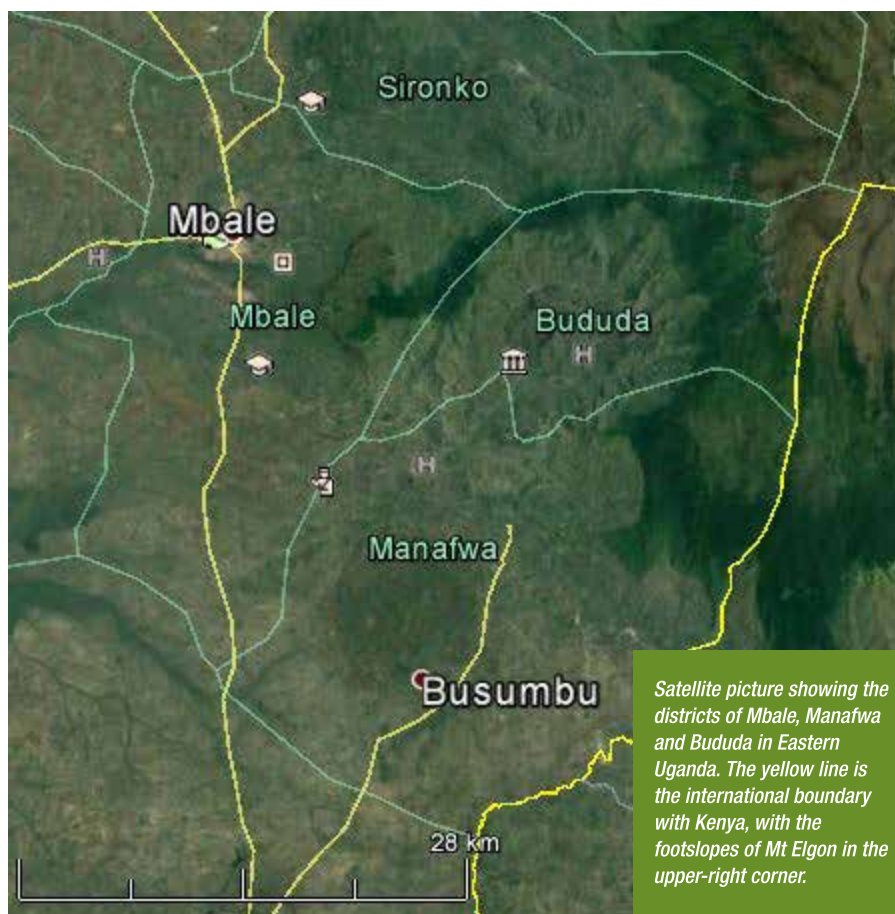
Scaling up farm practices for food security in Eastern Uganda

By FRED KALANZI, OKIA CLEMENT, SUSAN NANSEREKO, HILLARY AGABA

Introduction

A project entitled 'Developing Integrated Options and accelerating scaling up of Agroforestry for Improved Food Security and Resilient Livelihoods in Eastern Africa' shortened as Trees for Food Security (T4FS) is a four year intervention funded by the Australian Government through the Australian Centre for International Agricultural Research (ACIAR). The project is being implemented in sub-humid highlands of eastern Uganda. This area though a biodiversity hotspot and with ample rainfall faces challenges of environmental degradation, soil erosion and mudslides. The high population pressure in the region creates a high demand for tree products and services. Firewood is used by over 95% of the rural people while charcoal is sold in most of the trading centres in the region. During the first phase of the project (2014-2016), a Rural Resource Centre (RRC) was established in Mbale where 2,431 farmers accessed agroforestry interventions and a range of best fit agroforestry options established through participatory trials with farmers to overcome on-farm productivity challenges.

The current phase of the project (2017 - 2020) builds on the achievements of phase one. The aim of the project is to improve food security and smallholder livelihoods through the widespread adoption of appropriate locally



Satellite picture showing the districts of Mbale, Manafwa and Bududa in Eastern Uganda. The yellow line is the international boundary with Kenya, with the footslopes of Mt Elgon in the upper-right corner.

adapted agroforestry practices in Mbale,

Manafwa and Bududa districts. The project is implemented by the World Agroforestry Centre (ICRAF) in partnership with the National Forestry Resources Research Institute (NaFORRI), Makerere University, Mbale Coalition Against Poverty (Mbale CAP), World Vision Uganda (WVU) and the African Network for Agriculture, Agroforestry and Natural Resource Education (ANAFE).

Trees for food security

Trees play a key role in enhancing food security through a number of ways:

1. Provision of food: tree food (mainly fruits, leaves, nuts) provide an important livelihood option to the poor especially during lean periods when they need to cope with food insecurity. Fruits augment the consumption

Table 1: situational analysis in the project area

Context	Challenges	Opportunities
Downstream	Floods Water pollution Lack of fuelwood Siltation of streams Pests and diseases	Fertile soils Easy accessibility Market availability Streams for irrigation
Midstream	Soil erosion Reduced crop yields Lack of fuelwood Lack of fodder Low household income Mudslides/landslides Land fragmentation High population density	Fertile soils Accessibility to services Market opportunities
Upstream	Soil erosion Minimal social services Reduced crop diversity Mudslides	Fertile soils Clean water Few diseases and pests



A farmer-training session at Mbale rural resource centre. All photos ICRAF Uganda

of nutritionally adequate diets – thereby reducing hidden hunger caused by lack of a balanced diet. In the project area for example, food-crops such as beans which are important for food security require cooking for long hours and consume a substantial amount of fuelwood. Trees on farm can provide the much needed fuel-wood hence contributing indirectly to food security.

2. Enhancing food production: the high population pressure in the project area means that agricultural systems are more intensive and therefore susceptible to soil degradation and climate change impacts. Increasing tree cover in agricultural landscape will reduce soil degradation and vulnerability of agricultural systems to climate change thereby fostering food production systems. For instance shade trees in coffee have been found to reduce leaf temperature by up to 4°C. Trees are also habitats to crop pollinators and hosts to natural enemies of agricultural crops.
3. Economic access to food: tree products such as timber, poles, fuelwood, fruits, medicines, etc. can be sold to the market to enhance

household income. Part of this income can be used to meet household food requirements.

Situational analysis in Mt. Elgon sub-region

Given the topographical nature of the area, the agricultural landscape is divided into three distinct zones: lowland, midstream and upstream with a number of opportunities and challenges in each of these zones (Table 1).

To address the challenges identified, the project employs action research with agroforestry as a model approach. One of the unique aspects of trees for food security project is the use of the participatory on-farm trials to enhance co-learning between farmers and researchers and ensure uptake of agroforestry technologies. The concept involves farmers and researchers working jointly to experiment some of the agroforestry options that are presumed to mitigate the productivity challenges being encountered by the farmers. Trial-hosting farmers are supposed to deepen their understanding of the importance of integrating trees on farm to combat existing challenges and to be ambassadors in promoting some of the technologies that have worked. The participatory on-farm trials promoted cover the following interventions:

Fruit orchards: the project supports farmers with fruit trees that contribute directly to food security. Farmers in the warmer lowlands are supported with tropical fruits such as mangoes, avocados, pawpaws, jackfruit, while those in the highlands are supported with avocados, tree tomatoes, jackfruit, soursop and apples.

River bank stabilization: River Manafwa is the main water body in the area supplying the surrounding towns. Although there is a policy to govern activities adjacent to such a river, there is a challenge of poor enforcement because farmers do not observe the required distance thus the river banks are constantly threatened by wave erosion especially during the rainy season. As a result of poor farming methods in the watershed, silting of the river and flooding among downstream communities are observed. In addition, the water quality has deteriorated. To overcome this, the project is promoting tree planting along the river as well as some of the streams flowing into the river through river-bank stabilization trials. The main objective is to improve the water quality for many people in the area who depend on river Manafwa as the main source of water. The people in the project area have often planted *Eucalyptus* in the areas adjacent to the river and streams. In addition, a new tree species, *Neolamarckia cadamba* (burflower tree), which is fast growing is being promoted along the river-banks.

Fodder-banks: smallholder dairy production has a big potential in the area. In Bududa for instance, dairy farming has seen farmers producing low yields of milk due to poor nutrient composition of the available fodder which comprises natural pastures and crop residues that are low in proteins and other vital nutrients. The project aims to increase fodder availability using *Calliandra calothyrsus* as a supplement. *Calliandra* is promoted in form of small fodder-banks and hedgerows. Other fodder species (including traditional grasses such as elephant grass) are also promoted and are at times planted in a mixed combination with *Calliandra*.

Erosion control: given the topography, soil erosion is a major constraint to land productivity in the project area. By controlling soil erosion using trees and shrubs, the project aims to increase yields among small-holder farmers. It is building on conventional erosion control measures such as soil and water conservation structures, contour farming, and use of cropping systems that retain water and slow down erosion. The project adds value to some of these practices by introducing the tree component in the mix aimed at making erosion control structures more effective and multi-purpose. For example,



A river-bank stabilisation trial being established along river Manafwa.



Grafted mangoes raised according to farmers preference.



Farmers receive seedlings at one of the distribution centres.

farmers are encouraged to incorporate *Calliandra* and other tree shrubs in the natural vegetation strips or along the soil and water conservation structures. The trees incorporated help to stabilize the soil, provide additional fodder as well as fuelwood.

Boundary planting: boundary planting is highly desired in the project area given the small land holdings. Trees planted along the boundary can serve as windbreaks as well as a source of tree products such as fruits, firewood, fodder, poles and timber. For this intervention, tree species like *Cordia africana* (large-leaved cordia, mukebu), *Melia azedarach* (China berry, Persian lilac), *Grevillea robusta*, *Calliandra calothyrsus* are promoted, including fruit trees such as mangoes and avocados.

Scattered trees on-farm: trees scattered on agricultural landscape are an important source of ecosystem services such as soil nutrient replenishment, shade for crops, food, medicine, microclimate amelioration, habitat to natural enemies and pollinators, etc. These sustain the farming system by stabilizing yields even during drought. However, over time in the project area, trees on farms have been declining due to agricultural intensification. Tree species promoted include *Cordia africana*, *Albizia coriaria*

(mugavu, ober), *Maesopsis eminii* (musizi), *Podocarpus latifolius* (East African yellowwood), etc. Such trees are grown in relatively wider spacing to minimize competition for light with agricultural crops. Tree species that offer less competition with crops, with capacity to improve soil fertility through litter fall and nitrogen fixation are preferred for this type of system.

Woodlots: woodlots are an important agroforestry practice especially for farmers with relatively big and/or unproductive land. The type of tree species grown in this practice is of high economic value. To promote this agroforestry practice, the project supports farmers with tree species such as *Melia azedarach*, *Eucalyptus grandis*, *Neolamarkhia cadamba* and *Grevillea robusta*. The choice of the species is decided upon together with the farmer through a participatory process. Farmers with wood lots will be able to harvest products such as timber, firewood and poles in relatively bigger volumes and supply to the market.

Tree establishment and management practices

Training farmers on tree management is a key component of the project. The baseline situation in the project area indicated that there

are a number of mistakes made by farmers in establishment and management of trees planted on their farms. The spatial and temporal aspects of trees and crops were not being considered by some of the farmers. For instance, some farmers have grown eucalyptus in a mixed arrangement with crops. In some cases, the tree spacing is too close and in others, trees are mis-managed thereby increasing the competition between the components in the system. To overcome these challenges the project trains farmers on tree management.

The Rural Resource Centre Model

The project has established the Mbale Rural Resource Centre (MRRC), a hub for supply of quality tree planting materials. The RRC also acts as a training hub and convening place for local communities, district technical staff and local administration. MRRC consists of a tree nursery, propagators, seed stands, a Research Assistant, a Training Technician, the Technician's offices and a store for seeds and equipment. The MRRC supports other satellite nurseries run by farmer groups for income generation, like the Mt. Elgon Women Trust. Members of such groups have reported increased income from the sale of tree seedlings and the proceeds are used to buy basic necessities and pay school fees for the children.

Conclusion

The project has demonstrated that action research through partnership is necessary to scale-up agroforestry in the Mt. Elgon region. Candidate agroforestry technologies are being tested together with farmers and we hope that this can enhance feedback. The project promotes both indigenous and exotic tree species. Although agroforestry is not a new practice among the farmers, we want to move away from just retaining trees and leaving them to grow unmanaged. The new approach requires that tree species are deliberately selected, grown at an appropriate spacing and managed well to achieve the desired outcomes. Experience from similar agroecologies in Ethiopia and Rwanda have proved that the performance of indigenous tree species can be enhanced with good selection of planting material and management. We are optimistic that the project will enhance uptake of agroforestry technologies, increase tree diversity and cover across the landscape and lead to improved livelihoods of farmers in the sub-region.

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Quality standards for plantation establishment & maintenance

Looking for big brother

By JAN VANDENABEELE

Kenya Forest Service is the caretaker of an important asset, which is the land confided to their management. It is the largest plantation owner in Kenya. According to the results of the Natural Resources Management project (2008-10), the plantation area is 141,172ha, of which by then 94,573ha were stocked and 46,599ha un-stocked¹. This estate is scattered around the country, in areas of different rainfall and productivity, as follows:

Table 1: Physical distribution of KFS' plantation estate:

conservancy	area (ha)	area %	vol (m3)	vol/ha
Central highlands	27,423	29.0	402,139	14.66
Coast	152	0.2	9,932	65.56
Nyanza	879	0.9	54,880	62.43
Eastern	9,927	10.5	150,526	15.16
Mau	29,391	31.1	511,133	17.39
Nairobi	796	0.8	15,235	19.14
North Rift	19,717	20.8	351,612	17.83
Western	6,287	6.6	15,366	2.44
TOTAL	94,572		1,510,823	15.98

Source: NRM inventory.

As can be seen from table 1, more than half of the plantations (about 50,000ha) are concentrated in Rift Valley (Mau and North Rift), with another 6,000ha not too far away in western Kenya. Another concentration occurs around Mt Kenya (the Central Highlands) with 27,000ha. In summary, some 80,000ha are sufficiently packed together in two distinct areas, for allowing profitable large-scale operations by a big operator.

According to the same source, the volume per hectare and per species, all ages confused, was as indicated in table 2.

Table 2: Volumes per ha and per species

species	area (ha)	area %	vol (m3)	vol/ha
cypress	50,711.40	53.6	705,895.86	13.92
pine	21,143.55	22.4	430,042.48	20.34
eucalypt	13,543.96	14.3	192,865.36	14.24
other	9,174.03	9.7	182,019.79	19.84
TOTAL	94,572.94		1,510,823.49	15.98

Source: NRM inventory.

At a country-wide average of barely 16m³/ha, this is extremely low for exotic tree plantations, even taking into account that the age class 0-10 years (at 26.9% of total area) is included. Let's compare to a privately owned



Eucalyptus grandis plantation in Red Hill, Kiambu County. All photos BGF.

eucalyptus plantation, as described in table 3, including climatic conditions and yield. This particular plantation was established by Green Farm Enterprise, a contracting component of the Tree Biotechnology Programme. The difference is striking. At the early age of 7 years, stocking is at 455 m³/ha, versus the average of 14.24m³/ha of the government plantations. This is 32 times higher. Annual growth is a fantastic 65m³/ha, average tree height an astonishing 30m, and stem quality is equally good (see photos).

Table 3: Example of high-value plantation

location	Red Hill, Karuri town, Kiambu County
altitude masl	1940
yearly rainfall mm	1000-1600
E grandis	orchard grade seed (F2) from South Africa
planted	May-10
spacing (m)	2.5x2.5
trees/acre	640
mortality %	3%
surviving/acre	621
age yrs	7
avg height m	30
avg DBH cm	20
yield (m3/ha/yr)	65
total volume/ha	455

Source: Tree Biotechnology Programme

The explanation is simply high standards at every step of establishment & maintenance, from seed quality and species-site matching, over land preparation to planting and tending. The result is a high-profit operation, where

¹ S. Karega, 2012. The tree count is complete. Miti #14, p. 32-33.



Value for money. What good land husbandry can achieve. Only seven and a half years old.



Transmission poles of 12m length, from seven-year-old trees.



Plenty of fence poles from the remainder of the stems, 30m long minus 12m for the transmission poles.

almost all the trees can be sold as transmission poles. At a price of 5,000 Ksh per 12m pole, and 600 tree per acre, the owner got an actual income of 3m Ksh for selling off one acre, and this only 7 years after establishment. Fencing posts and firewood, of the remaining biomass, contribute further to the income, in a significant way. Land value apart, for an investment of 220,000Ksh/acre, including clean-up of the land, establishment and tending during seven years, this is a very attractive return.

This is not a plea to fill up government land with eucalyptus plantations, but to show efficient land use, leading to value for money. It is clear that privately owned plantations are a better way to achieve this. Can this be done under the current concession system, as allowed under the Forest Act? The answer is no, due to largely political reasons, where concessioning off tracts of government land for tree planting & exploitation is quasi impossible after court decisions blocking the process.

Benson Kanyi, CEO of the Tree Biotechnology Programme, suggests that establishing a commercial company operated along private lines, but owned by the government, such as the South African Forestry Company Ltd (SAFCOL), might result in optimal returns, to more benefit for Kenyan citizens. SAFCOL is wholly owned by the South African Government, under its Department of Public Enterprises. It does not only own companies like Komatiland Forests, with over 187,000ha of government land, but also is a minority shareholder in SiyaQhubeka Forests, a community-corporate-government partnership, a potential model to the Kenyan Community Forest Associations. SiyaQhubeka Forests manages 22,000ha of

plantations. (Interestingly, SiyaQhubeka's logo includes the slogan "Forestry for life".)

A nucleus of 80,000ha high-potential land with surrounding out-growers, where trees are grown according to proper quality standards, would result in enough raw material for several sawmills and other processing industries.

One single company, in fact a government-owned entity, would operate across several counties, provide a market and stimulate out-growers through better pricing for quality timber resulting in higher yields. It would set industrial standards for plantation establishment & management to a level that is now rarely encountered in the country. To obtain sufficient raw material, existing timber industries would have to accept the same quality standards in order to get higher yields. A KFS-owned company, with its own big processing plants, would stabilize prices and stimulate the market to produce more logs. Out-growers would do well, and growth of contracting companies specialized in establishing & managing forestry operations would be another consequence. Existing saw-mills and other processing facilities would be forced to operate amongst more efficient lines, pay a better price for logs, or be driven into closure. The company's profitability would be enhanced by adding additional lines of income, like eco-tourism, bee keeping, charcoal and briquette production, and why not, even grazing; contracted to Small & Medium Enterprises on a commercial basis.

An efficient forest plantation entity would also create a demand for genetically improved germplasm which would spur advanced demand-driven research and focused forestry training. This would propel the benefits of tree breeding and

concepts of tree improvement research into the public domain as with other sectors and create opportunities for innovations in forestry science unlike the current stagnation and brain drain being experienced in the sector.

It is an enticing picture, one that would ensure efficient land use, learning from what has been achieved in South Africa, and hence possible to emulate, but going against existing attitudes in the Kenyan forestry world where conservative attitudes and fear of change are obstacles to its achievement. It might not be to the liking of other private operators risking being locked out of a cheap supply of logs, but the concession option seems to be canceled due to legal obstacles. The creation of a "Kenyan Forestry Company Ltd" doesn't need to become a state-controlled behemoth depending on political masters, but an independent entity run on private lines. The best guarantee to achieve this would be a substantial shareholding for the private sector, so there would be joint management. For KFS and forestry to attract higher financial investments from state Treasury and external sources, and as well sustain public respect, innovations must be applied to secure competitiveness amongst other sectors such as agriculture, infrastructure and education.

Anyway, the area under plantations wouldn't be worse of, and wasteful use of an increasingly rare resource (land!) cannot be tolerated anymore in an era of climate change, worldwide competition and a growing population aiming at higher standards of living.

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Protecting Water Towers for Prosperity

An opportunity for forest adjacent communities

By MICHAEL MURATHA



Kenya Forest Service Board Member Gelas Muse (center), together with the Water Towers Project Manager David Chege (2nd right), among other KFS officials, when they toured one of the rehabilitation sites in Elgeyo Marakwet County. All photos Michael Muratha, KFS.



Project Manager David Chege addressing Bororiet Farmer Field School (FFS) in Transzoia County. The Project is supporting communities through FFS groups to enlighten them.

Kenya's water towers remain vital national assets as they provide numerous services including climate regulation, recharge of groundwater, river flow regulation, flood mitigation, control of soil erosion, water purification, and Carbon storage. These services support key economic sectors, including energy, tourism, agriculture as well as water supply to

urban centers and industries. In line with these, the Government of Kenya through a number of partner institutions in collaboration with the European Union are working tirelessly to conserve these water towers.

The conservation work is being carried out through the Water Tower Protection and Climate Change Mitigation (WaTER) programme under four key result areas. It is coordinated

by the Ministry of Environment and Natural Resources, Kenya Forest Service (KFS), Kenya Water Towers Agency (KWTA), Kenya Wildlife Service (KWS), Kenya Forestry Research Institute (KEFRI) and the Climate Change Directorate as well as eleven counties (Siaya, Kisumu, Nandi, Uasin Gishu, Transzoia, Elgeyo Marakwet, Bungoma, Busia, Kakamega, Vihiga and West Pokot) as the implementing agencies.

KFS, KWS, KWTA and the Climate Change Directorate are implementing result area two with the main objective of improving the quality and quantity of ecosystem services of two Kenya's water towers namely Mt. Elgon and Cherengany. More importantly, the programme aims to eradicate poverty by creating alternative sources of livelihood to the forest adjacent communities.

The programme has now been running for one year and has so far made commendable progress. These include titling of forest blocks in the project areas; conducting capacity building to communities on bamboo propagation and Climate Change; establishing Farmer Field Schools and rehabilitating degraded hotspots in the project areas. Other on-going activities include the development of an environment monitoring system, development of concepts for forest parks and enhancing capacity at county level.

Project Manager David Chege is optimistic that the programme is progressing on well. He further adds that it will continue to enhance land productivity for socio-economic development in the two water towers. More importantly, the programme is working to improve livelihood of 5,000 households through efficient ecosystem management and enhanced stakeholder participation.

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Agroforestry Agents ready for action, which is farm visits and meeting farmers



Rino Solberg BGF's Chairman (2nd left) with Norwegian investors at Kibwezi Mukoyu Farm (Makueni County)



Florence Muthui, Agroforestry Agent, with one of her farmers in the harsh drylands of Eastern Mwingi (Kitui County)



The committee of Nyongoro ranch, BGFs partner in Lamu County



A stand of seven-year-old mukau trees in BGFs Kiambere plantation, Kitui County.



Raised beds for better root development of melia, at BGFs nursery in Nyongoro, Kenyan coast.



Better Globe members visiting the FSA (Financial Services Association or Village Bank) in Mbugu location, Eastern Mwingi

On 1st January 2017, Better Globe Forestry (Kenya) Ltd, became the holding company of The Better Globe Group of companies, which aims to promote massive tree-planting and sustainable agricultural programs in semi-arid areas through forestry, micro-finance schemes, educational programs and water supply to communities. BGF was incorporated in Kenya in 2004 with the vision of eradicating Poverty and Corruption in Africa. Consequently, the Mission of BGF is to plant as many trees as there are people on this planet, and by "Social Entrepreneurship" finance a sustainable implementation of the Vision.

Miti magazine is a publication of Better Globe.

It is the policy of BGF to, among other things:

- Create attractive financial opportunities for present and future investors,
- Continuously identify and address the needs of employees, suppliers, customers, shareholders, the community at large and any other stakeholders,
- Focus on the need to help fight poverty, through promoting massive tree planting
- Create and sustain motivation throughout the organisation for meeting its business and social objectives,
- Continuously maintain and review an effective and efficient Quality System which as a minimum satisfies the requirements of the appropriate Quality System standard(s),
- Continuously improve the performance of all aspects of the organisation.



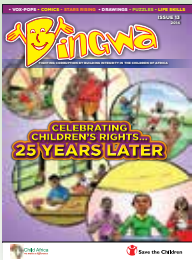
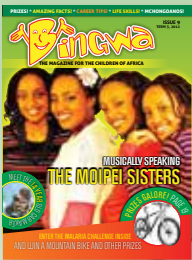
One of BGFs caterpillars clearing bush to make place for planting of mukau (Nyongoro ranch)

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