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A Pocket Director of Trees and Seeds in Kenya

BY Wayne Teel

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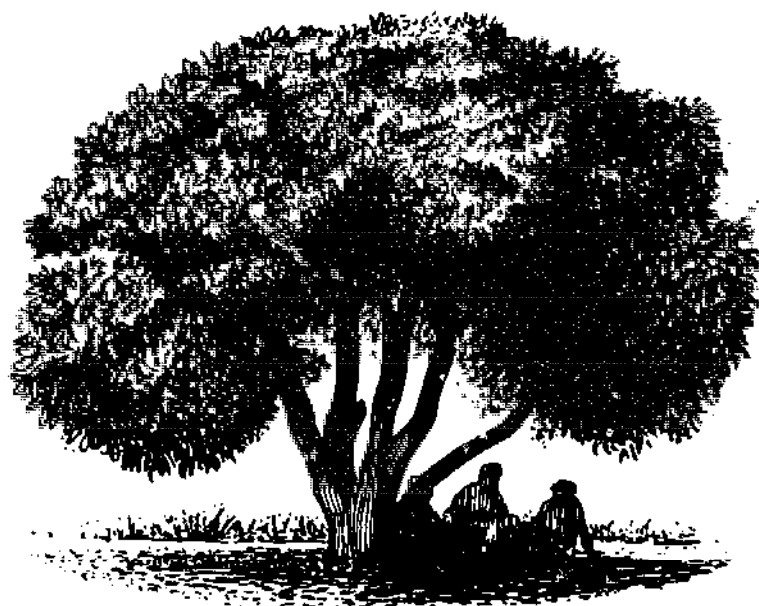
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A Pocket Directory of Trees and Seeds in Kenya

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WAYNE TEEL**

**Illustrated by
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KENGO

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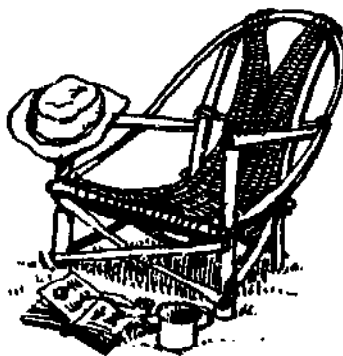
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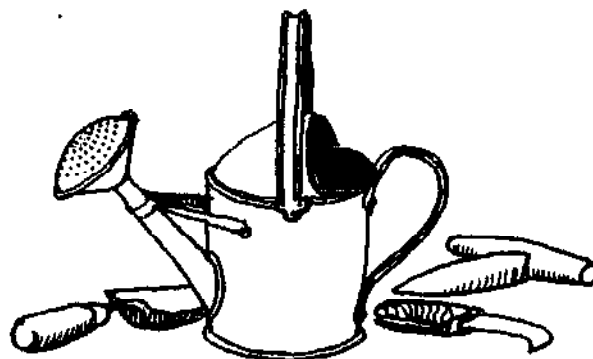
I wish to express my gratitude to the individuals and organizations who greatly assisted in developing this directory. Most of these individuals and their respective organizations are named in Chapter 5 under 'Resource People'. However I should like to mention a few noteworthy contributors.

Special thanks go to Mbonye Arsen for his extensive research work, especially in the initial phases of my preparation of this book. He has also continued to help with the details of corrections, proof-reading and research as part of his on-going research activities at KENGO.

For their assistance in conceptualizing, editing and distributing the directory, my appreciation extends also to Achoka Aworry, Coordinator of KENGO; Louise Buck, Agroforestry Planning Consultant to CARE-Kenya and Andreas Speich, Rural Forestry Advisor to the Kenya Forest Department.

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FOREWORD

Tree planting is a development task of our entire Nation. His Excellency, President Daniel T. arap Moi has provided great inspiration to us all in this endeavour. Many groups which include government agencies, private volunteer organizations and individuals have already started the process of rural tree development. In order to aid this task, all groups and individuals must pull together to solve the problems of woodfuel shortages, erosion and many others.

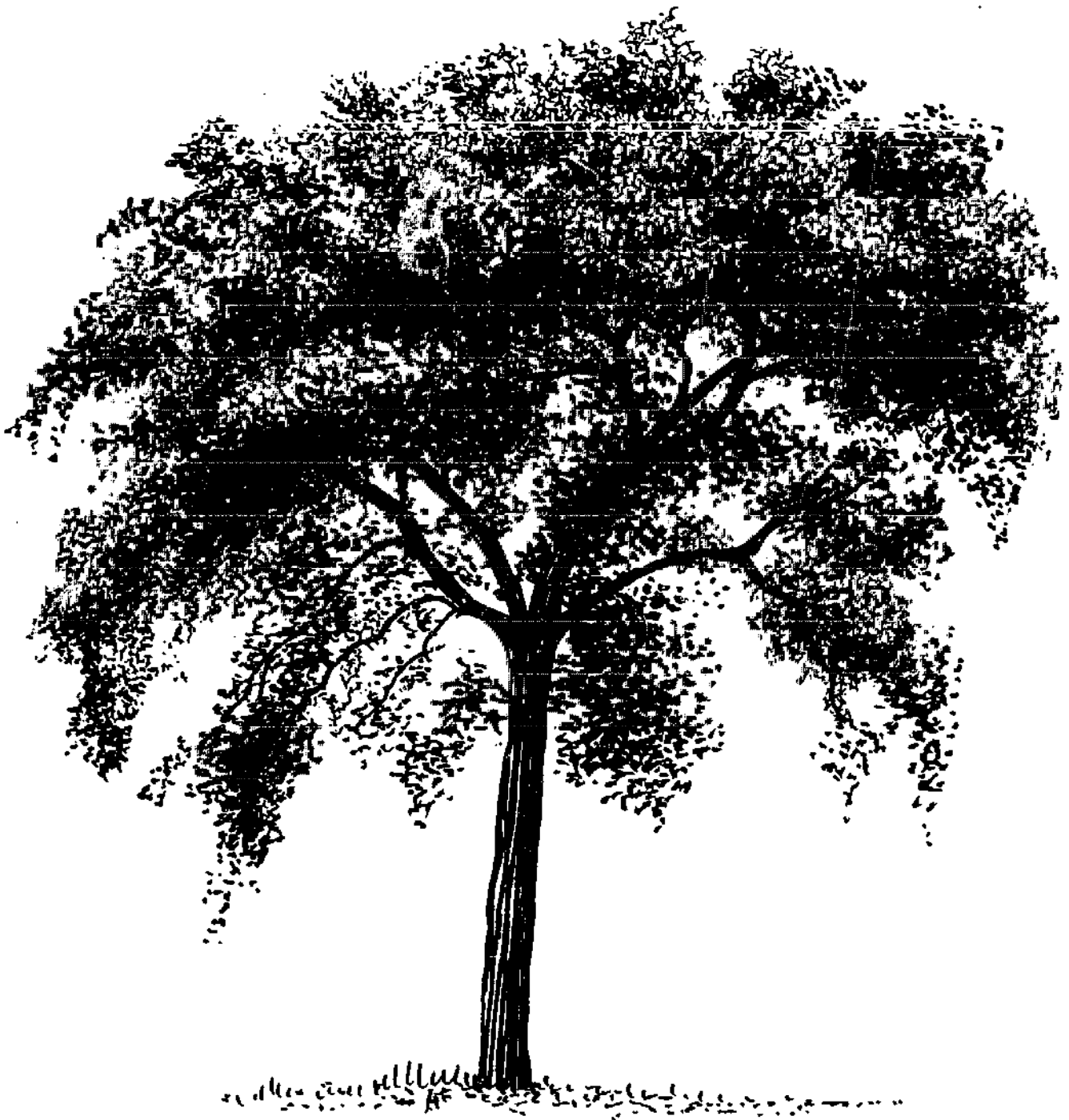
Kenya is blessed with an abundant variety of trees suitable to meet the needs we face in our variety of climate conditions. Our resource base is large. All that is lacking is the knowledge of good tree planting and management practices. It is the role of government bodies and private volunteer organizations to aid all wananchi by providing good quality information and assistance to support them in this task.

This book is simply one part of that aid. It serves as part of our policy of assisting self-help development activities. It is my hope that this Pocket Directory of Trees and Seeds in Kenya, will provide a successful example of cooperation between government bodies, private organizations and individuals in supporting the development of Kenya.



O M Mburu

CHIEF CONSERVATOR OF FORESTS



tree: there are many definitions of tree, often depending on minimum mature size and growth pattern of the main stem. Dale and Greenway make a cut-off height of 6 feet (2 metres) for *Kenya Trees and Shrubs*. One definition states, "A tree is any woody perennial with an upright stem having the capacity for continuous growth." (From Richard St. Barbe Baker, *I Planted Trees*).

INTRODUCTION



TREES ARE DISAPPEARING

There was a time, not so long ago in Kenya, when trees were taken for granted. There were so many, often so thick with dense undergrowth that walking through was a hard task. Today that time has gone. Trees no longer dominate Kenya's high potential land. In areas of lower rainfall and less agricultural potential, trees are disappearing rapidly, being cut for timber, charcoal, or just to clear the land. As they become more scarce, our awareness of just how important trees are, grows. Without trees where can we sit away from the heat of the mid-day sun? Without trees what do cattle, goats, sheep and camels eat at the end of the dry seasons? Without trees, with what are homes built; with what is food cooked and where do we get fruits to eat? Without doubt, trees are good.

Fortunately, the solution to Kenya's increasing lack of trees lies within our power. Anyone can plant trees. The task is not difficult nor does it take resources beyond those available in rural areas. Many people in Kenya already plant trees on their own. They have no formal training. It takes only a little good information, often readily available within the local situation, and a little commitment and determination by people who are willing to take the time to obtain seed, plant trees and protect them, until large enough to grow on their own. The most important ingredient in successful tree-planting is care.

SPECIES SELECTION AND SEEDS

Once people decide to become tree planters they are immediately faced with two questions "Which type of trees do we grow?" and "Where do we get the seeds?" The purpose of this book is to answer, at least in part, these two fundamental questions.

Species selection is a two-step process and neither step requires

outside assistance. The first step is to identify why you need to plant trees on your land. Trees can meet a variety of needs, so it is best to select species that can meet all of them. Once the needs are pinpointed, the second step of matching local trees to your requirements becomes possible. Local trees are, most often, best because they are known to do well in those conditions and their seeds are more easily obtained.

Relying on outside suppliers for species selection and seedlings, can sometimes cause problems. You can never be certain that those trees will survive in the climate and soil conditions of your particular area. For example, nurseries have been known to distribute seedlings of certain exotic Eucalyptus and Cypress species to people in dry areas—like Machakos and Kitui districts—where these trees cannot survive as they are generally unsuitable for that particular climate. In other cases, the species may be correct but the area where the seed comes from may be so different from the area of planting, that the tree fails to grow as expected. Trees, even of the same species, adapt differently to climates and soils. It is always best to sow seeds from trees growing in places where conditions are similar to your own. Foresters use the term *provenance* to describe seed from trees within a specific ecological range.

If you select trees growing locally to fulfill your purpose, it means you can also collect seeds locally. Collecting seeds is not difficult. It only requires that you observe the trees' flowering and fruiting cycles, so that the seed can be picked when ripe. You may even be able to collect enough seed to supply neighbours, or to sell if the demand is high.

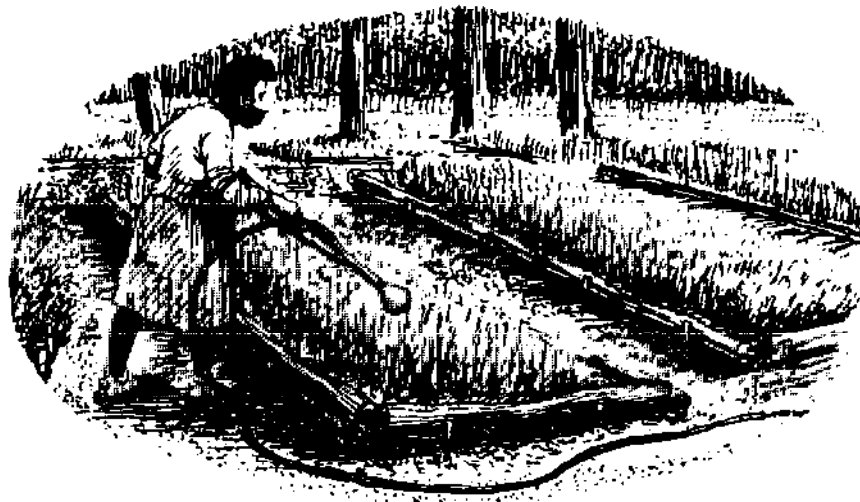
THE LOCAL SEED SUPPLY

In the recent past, seed collection and distribution had been centralized through the government's relevant ministries. This continues to be the case for certain species of timber trees, such as Cypress and Pine, to ensure the best provenance selection. These government sources however, are not able to deal with the wide variety and extent of today's locally rising demand. To meet this demand, it has been found that a decentralized approach to seed collection and distribution is essential. Therefore, informed and dedicated local people have become the major seed suppliers for species available in their local areas. They are also informally connected with groups like KENGO (Kenya Energy Non-Governmental Organisations) or the Forest

Department's Rural Afforestation Extension Service, which can help people on a national level to draw upon local seed surpluses. This decentralization encourages the collection of a broader range of more appropriate species, and increases the total number of people with access to seed supply. Although the decentralized approach may, initially, encounter some difficulties in the control of the quality of collected seed, these will be overcome, since the skills needed for seed collection are, for the most part, already available in rural areas. Additional advice is increasingly available also; indeed, that is part of the function of directories like this one.

SEED FROM FURTHER AFIELD

Sometimes certain needs for trees cannot be met by trees which are growing locally. Tree planters must then look to other sources for seed, or even select exotic species. This directory is a tool to help you find appropriate tree species and their seed. It aims to spread reliable information so that wise choices about trees can be made. The directory also points to potential suppliers of seed, but it does not claim to present all the possible information involved in the selection



of species, seed collection or availability. In fact, in some cases, the much needed specific information is not readily available. For that very reason, it is hoped that this directory will encourage the establishment of an informal exchange network of information about trees and seed. There are many items about trees which we do not mention here which you, the reader, may know. Your sharing these with us would be highly appreciated. Also you may have access to, or even be a seed supplier whom we do not list. If you, or someone you

know, can supply us with information or be a seed source, please send a letter to: Tree Seed c/o KENGO, P.O. Box 48197, Nairobi.

As stated above, this book cannot hope to cover within its limited scope, nor even mention, *all* the possible aspects of "Rural Tree Development" which need consideration. A number of issues, however, do deserve mention for further consideration and as part of the information exchange network. These are elaborated upon in the last chapter of this book. Perhaps at some future time it will be possible to publish some answers to these questions and subjects raised there.

WHAT YOU WILL FIND IN THIS BOOK

This directory is divided into six chapters. They are ordered in a manner which will best aid you to determine the most appropriate trees for your area and how to find seed for them, along with the best method of germination. Each chapter is previewed briefly below.

Chapter 1: Questions and Answers

Here we have compiled a list of questions which are normally asked about species selection and seed collection. The answers given provide some basic information about choosing which trees to grow, how to collect seeds and briefly, how trees propagate. The section also includes some general information on how to store and treat seeds before sowing.

Chapter 2: Locational Climate Type List

The climate of Kenya is very varied. Rainfall ranges from as low as 100mm to as high as 3000mm per year. It has areas of intense equatorial heat, like Garissa or Malindi, as well as the snow-capped peak of Africa's second highest mountain, Mt Kenya. The range within which a tree can be planted is determined primarily by rainfall and temperature. Rainfall and temperature zones overlap but can be differentiated into a total of 33 zones in Kenya, according to the Agroclimatic Zone map published by the Kenya Soil Survey. For purposes of simplicity, some temperature zones have been combined in our list. The climatic types are identified with the name of the most representative town found within that type.

Chapter 3: Climate Type/Tree Species List

For each of the climate types, this chapter provides a list of all the trees which grow, or could grow in that area. This is only a selection

of trees which may be recommended with priority. It may be possible that some of these trees will grow in areas for which they are not listed.

It is almost certain that all the trees listed under a given climate type can grow in that area, but some will perform better than others. For this reason an asterisk* has been placed after those species known to grow best in this climate type which is recognised as the climax zone for these species.

Chapter 4: Individual Tree Species Profiles

This chapter provides information about each of the recommended tree species. It contains a choice of 90 tree species; indigenous, exotic and fruit, listed in alphabetical order by botanical name. Following this, for both indigenous and exotic trees, is a brief look at their uses and an even briefer description of the tree itself. The preferred climatic type of the tree is then given and, if known, the most common growing sites. Next, information about the seed is provided. This includes approximate size and weight, estimated seeding time, length of viability and best germinating techniques. Lastly, comes the list of potential seed sources to contact if seed cannot be found in your local area.

Fruit trees, because of their importance as a food source, are listed separately. The information on fruit trees is also treated in a slightly different manner. Seeds and seedling suppliers, are listed by province at the end of the section. The list of fruit trees available as seedlings from these suppliers, follows the provincial listing.

Chapter 5: References and Resource People

This chapter is a list of sources used for the information in this book, as well as others which could be relied upon to provide further information about growing these trees. For most of the indigenous trees information is scarce, limited generally to botanical literature. There is considerable information available about fruit trees. More can be obtained on them and a few of the other species in any scientific library such as the ones listed on page 136.

Chapter 6: Information Exchange

When using this directory, you may want to know things that it cannot answer. This chapter tells you where to go, or whom to ask for answers. On the other hand you may have some important information about your local trees, which may be of value but is little known to people in other areas. We would like to help spread this knowledge around and this chapter will suggest how to do it.

CHAPTER ONE



Questions and Answers

NATURAL FOREST

Nearly everyone has taken a walk through a forest or woods growing naturally near their home. Perhaps we can take a little walk now—if only in our imagination. The types of trees we see on our walk will depend on where we live. In the hot, dry north east, we would see mainly thorny acacia trees and rubbery branched commiphoras. In the wet highlands of Mt Kenya or Mt Elgon the forest is far denser, with bamboo, podo and other species. Yet everyone would see similar things as well.

Natural forests have a mixture of species of all sizes. If we look on the ground we might see the young shoots of newly germinated seed. In more open areas, young seedlings and small, immature trees are abundant. Older stands of mature trees may be in flower, or we might see fruits, seeds or pods hanging from branches. Occasionally we see an old tree, many of its branches dead and it may or may not have flowers or seeds. Also in this forest are many shrubs, perhaps some grasses and a wide variety of birds and animals.

These natural forests are shrinking for a variety of reasons. People need more land for cultivation, so trees get cut down and the bush with its young trees is cleared. Trees provide the most important source of fuel as well. If you look in areas where the woods are gone, except for a few scattered trees, many problems are evident. Perhaps the main ones are soil erosion and the need for women to walk many miles to get firewood.

Think of all the ways you use trees. Now think what your life would be like without trees of any kind.

Can we help the trees to start again?

Yes. Without our help the existing trees will not be able to regenerate fast enough to keep up with our demand for fuel,

timber and farmland. We can grow new seedlings in a nursery, plant them and protect them from damage by people or livestock until they are large and sturdy enough to grow on their own. But before we begin, we must select the right indigenous and exotic species to grow in our areas and then find good quality seeds.

The following 40 questions and answers should help us make a good start and see us on the road to good tree planting.

CHOOSING THE RIGHT TREE SPECIES

1 How do we choose tree species to grow in our area?

The best trees to grow in any area are often those found growing naturally in that area. The uses of such trees will be well-known: fuelwood, fodder, fruit, shade, medicine and many others. Select those species which meet the major needs you have in your area.

2 Are all trees good?

Not necessarily. Some trees, like *Acacia hockii* (Muraa-Kikuyu) when it grows in the highlands, turn weedy very quickly and may be difficult to remove or control¹. It is best to select those trees that are regarded as valuable and which do not pose problems for agriculture or your animals. As an example, *Cassia siamea*, a common exotic species, should never be grown near a place where pigs are kept because the leaves and pods are poisonous to them.²

3 Can any tree species grow anywhere?

No. Every tree is adapted to a certain climate range in its natural distribution. It is important to select those species which could grow naturally in the climate of your area. To help you do this we have in this book divided Kenya into a number of Climate Types, derived from the *Agroclimatic Zone Map* published through the Kenya Soil Survey.

A climate type is determined by rainfall, potential evaporation and temperature. To find your climate type, look at the Locational/Climate Type List in Chapter 2, pages 27-36. Find your province, district, and the town closest to your home. In the third column will be the Climate Type designated by a major town. Turn to the climate type species lists in Chapter 3 pages 38-56 and find the page corresponding to your location's type. This will have a list of species suitable for your type. From there you can look up the individual

¹ *Kenya Trees and Shrubs*

² *Firewood Crops*

species listings in Chapter 4, which provide local names, uses and groups or persons who are seed sources.

4 What are indigenous and exotic species?

Indigenous trees are those which have always grown and reproduced naturally in Kenya. In the individual species profiles (Chapter 4), they are indicated by having 'Local Names' as their first piece of information.

Exotic species are those which were imported to Kenya from suitable locations around the world. For example all eucalyptus trees are exotics from Australia.

Fruit trees are listed separately even though many of these are exotics, because of their importance.

5 What are the important characteristics of a growing site?

The most obvious variables in a planting site are rainfall, temperature and potential evaporation. (The last variable tells us how much water the land could lose, if water lay open on the surface.) These variables were used to determine the climate type lists. Other important factors to consider are soil and slope. Tropical soils vary greatly from place to place and some species are well-adapted for a certain soil type. For example, *Acacia nilotica* (Burguge-Boran), does well in black cotton soils in Zone V-2, while *Terminalia brownii* (Muuku-Kamba), growing in the same climate type, needs sandier well-drained soil. Where soil requirements are known, they are listed with the species. However our information on soils is incomplete. You should therefore, make certain a tree will grow in soils of your area before proceeding with planting. (See p 21 for simple soil test).

6 What are the differences between home areas of tree species?

Sometimes trees grow in areas widely separated geographically, but still in the same type. For instance, *Maesopsis eminii* (Musizi) grows in the Western Province, Meru and in Taita Hills. It has been found that seed from Taita Hills, germinates more readily than seed from Kakamega even though conditions are similar.³ In this case Taita Hills seed is better. When getting seed from outside your area it is advisable to obtain it from more than one source.

Some species grow over a wide range of climate type. *Acacia tortilis* (Kura-Somali) can be found from Siakago (Kisumu/Murang'a climate type) to North Horr (Wajir climate type). However

³ Forest Department Studies Unpublished

trees growing in one type are adapted to that type, so select seed from your type or perhaps, a drier one. *Acacia tortilis* seed for example, from Wajir type trees grows well in Taveta/Isiolo type but, if you reverse the situation Taveta/Isiolo type seed, does not produce good trees in Wajir type.

SEED: PRODUCTION, PROPAGATION AND USES

7 Where do seeds come from?

All tree species reproduce in one form or another. The process by which seeds are formed is well known. First, the mother tree flowers. Often trees are hermaphrodites, meaning they have both male and female flowers (or the flower has both male and female parts). Some trees like pawpaw or *Chlorophora excelsa* (Mvule) are divided sexually. Once open, the female flower receives from the male, pollen which is carried by insects or birds, or borne on the wind. After pollination, seeds take from one month to one year to mature before they are ready for harvest.

8 Do all trees produce seed?

No, some trees produce only male flowers and do not bear seed. Other trees may be injured, diseased or genetically incapable of producing seed. Some types of citrus fruits do not reproduce from seed and require grafting or budding. An example we see everyday is the edible banana, which reproduces from root suckers.

9 When do trees begin to produce seed?

This is highly variable and dependent upon the species. Fast-growing, short-lived species, like *Sesbania sesban* (Sao-sao —Luo), begin producing good seed in their first year. Slower trees like the mango may take up to seven years and large forest species may require an even longer period.

10 How many seeds do trees produce?

Again this varies according to species and conditions. Big-seeded fruits like mango and avocado produce relatively few whereas *Acacia tortilis* can produce up to 100,000 per tree in one year. Very small-seeded trees, like *Conocarpus lancifolia* or *Casuarina equisetifolia*, provide nearly uncountable amounts.

11 When are seeds mature?

Each tree species has a set pattern of seed production. Often seed

drops naturally from the tree just before or during the rains. Many species in Kenya have seed which ripen in August or September. For collection purposes, it is important to note the flowering and seeding pattern of trees in your area. A species growing in South Nyanza, like *Olea africana* (Ol-orien—Masai), may seed at a different time to those growing in Central Province. (We have tried to estimate seeding times for each species, but remember that these are subject to variation due to weather pattern changes.)

12 Do trees produce seed every year?

Most trees do, though this too must be watched. Often species go through cycles of seed production, perhaps regulated by weather patterns. *Acacia senegal* appears to have a five-year peak seeding pattern in the Sudan. Avocados produce heavy crops every second year. (Seeding times, where they are known, and patterns for individual species are provided in the listings.)

13 How do seeds spread from the mother tree to different places?

Nature gave trees numerous methods of distributing seeds. *Acacia* species have hard seeds in pods, which are eaten by goats, wild animals or birds, and deposited ready to germinate with the manure in the rains. Others, like podocarpus or vitex species have seeds readily eaten by monkeys whose messy habits scatter seeds far and wide. *Markhamia* and *terminalia* seeds have wings which take to flight on windy days. People, too, distribute seed for nature, often without intention. Having an edible fruit often helps a seed find a place to germinate.

14 What is the difference between a fruit and a seed?

Fruits come in many shapes and sizes and—with the exception of some citrus varieties and bananas—usually contain one or more seeds. When we use the word *fruit* we do not mean only those species which have an edible pulp surrounding the seed. A fruit is the product of a single pollinated flower with either a hard or skin cover, a pulpy interior either surrounding the seed or seeds, or having the seeds embedded in the pulp. Seed can be separated from other parts of the fruit prior to planting without affecting growth. The purpose of the cover and pulp is to provide protection for the seed while it germinates and to attract spreaders of the seed.

15 Are there edible seeds?

Yes, probably more seeds are edible than we know, but those which are known are listed. Cashew nut, Macadamia nut and coconut are the three most often cultivated in Kenya. (The coconut is slightly different in propagation from the other two.) Other edible nut-bearing trees include *Terminalia catappa*, grown at the coast, *Balanites aegyptiaca* (Tuyunuwo-Pokot) whose seed is used for oil and flour in times of drought and *Acacia senegal* (Edad-Somali) whose seed is often dried and eaten as a vegetable.

16 How much do 1000 seeds weigh?

This varies dramatically. One thousand *Eucalyptus camaldulensis* seeds may fit easily into the palm of your hand and weigh less than one gram. But one thousand mango seeds would have trouble fitting into a *gunia*. It is important to know the approximate weight of 1000 seeds to determine the method and cost of transport, calculated by weight, and how many you wish to purchase.

THE MOTHER TREE

17 Do trees grown from seed have the same traits as the 'mother' tree?

The full answer to this question can be quite complicated. Normally, growth patterns of seedlings are similar to those of the mother tree. This is more true if the mother tree stands in the midst of other trees of the same species which have the same traits. If a mother tree is isolated, the offspring could be highly variable. Species which have male and female trees require more observation. A short, twisty or low quality male could provide pollen for a high quality female and produce poor seedlings. In general, however, a good mother tree will produce offspring following the same pattern.

18 What about the father tree?

Since 'father' trees produce no fruit or seed, their importance for non-wood purposes is reduced. Ratios of one male to 50 or more female are usually sufficient for fruits like the pawpaw or the date palm. In wood species, like *Chlorophora excelsa*, an equal mixture of male and female trees is acceptable, and the traits of the father tree are judged in the same manner as the mother tree.

19 Can people control the pollination process?

For most trees it is nearly impossible. In some species, especially the date palm, it is essential for good fruit production. The only effective control consists of removing from seed stands those trees with unacceptable traits. Pollination in fruit trees, or in other types, is often made more efficient by using bees. Bees, taking nectar from flowers, carry pollen on their legs from flower to flower and have the added bonus of producing honey. Good honey trees include *Cordia abyssinica* (Muringa—Kikuyu) and *Prosopis juliflora*.

20 How does one identify a good quality mother tree?

The quality of a mother tree depends upon how you wish to use the tree. Timber trees are best when they grow very straight, with few branches and at a fast rate. If fuelwood production is your goal, then fast growth and high wood yields become more important. Fodder trees however, require a different approach. With them production of leaf matter, pods and the ability to recover after the lopping of branches are the most important factors. For fruit trees, take seed from those trees producing good quantities of sweet fruit, of a marketable size, where it grows within easy picking reach. (Often for fruit trees one should have grafted or budded stock, selection of which is best done by trained people. For the best budding stock, try to locate centres which do grafting and budding professionally.) As a general rule, take seed from healthy trees which are already good producers of the product desired. Avoid isolated, poorly-shaped, or low-producing trees or stands, and remember that often the best trees for seed collection are those growing in the midst of a healthy stand of the same species.

21 Does the place a tree grows affect its choice as a mother tree?

Yes and no. On poor soils or in ecological fringe locations, a seed of high genetic quality may develop on a poorly-formed tree. It will be difficult to know if the seeds of such a tree are of good quality, because we do not know if the poor site or the tree's traits are the cause of its poor form.

Every tree has a range of climate conditions within which it grows. On the edges of the range, the tree is genetically specialized for the dry or wet conditions and has a lower ability to adapt. Trees located in the middle of the range however, called the *climax zone*, have the greatest ability to adapt to a new location within the climatic range. It

is best therefore, to collect seed from mother trees in the climax zone, if that is possible. It is still best to get seeds from the same zone as your own and, as far as possible, growing in the same soil type.

22 How do we collect seeds?

There are many ways to collect seed and most of them are very simple. The easiest seeds to collect are large-seed species or those with pods. You should learn the time of the year when the seeds ripen in mass. Pods or fruits are best taken from the tree when their stems break easily from the branch and the pod or fruits have changed colour or are becoming dry. For example *Juniperus procera* turns blue when ripe. The seed can be separated after drying is complete.

Small-seeded species present more difficulties. Often seeds grow in cones (like cypress and pines) or woody, pulpless fruits (*Eucalyptus sp.*, *Casuarina sp.* and *Grevillea robusta*). These normally grow, ripen, dry and open without falling from the tree, dispersing the small, often winged seed in the wind. Because of this it is important to collect the cones or woody fruits after ripening but before they are completely dry. The collected cones and fruits can then be dried in a clean place, out of the wind, and the seed gathered after it has separated.

23 Are there easy ways to collect seed from tall trees?

Unfortunately tall trees, which are often the best types of a species, present many difficulties for the seed collector. Sometimes it is best to collect seed after the tree has been cut down. This method is commonly used for eucalyptus and cypress trees. It is not wise to cut down a tall tree just to collect seed.

A tall tree can be made safer by the use of a safety harness and strap. The harness wraps around your shoulders and hips and it is attached to the strap about your waist level. The strap goes around the tree and hooks into the harness again. A tree climber may also use spurs attached to his boots which provide a good grip on the bark. By leaning against the strap and lifting with his feet then raising the strap, a good climber can swiftly climb a tree to branch level. Once there, seed collection becomes easier, even though most seeds will still be out of reach.

A pruning hook can be taken up the tree or used from the ground. This consists of a long piece of wood or a metal pole (bamboo works well) with pruning shears attached to one end. A rope connected to the movable cutting-blade stretches to the holder allowing him to cut down fruits, pods, cones or any other seed 'container'. The seed can



then be picked up from the ground. For edible fruits, a basket can be attached under the pruning hook so that fruit drops into it rather than to the ground.

Pruning hooks are rather expensive. A cheaper, but less efficient option, consists of a long stick with two nails pounded in one end (or simply a wedged 'V'). This is used to break the stem attaching seed to the tree.

24 Can seed be collected from the ground?

Yes, and for some tall trees, like *Acrocarpus fraxinifolius* or *Podocarpus sp.*, this is the best way. These species have hard seed coats, not easily damaged and do not lose viability readily. Podo seed, well liked by Colobus monkeys for food, should be collected from the ground daily or your seed supply may all be eaten up. Some species, like terminalias or combretums are subject to insect attack and should be collected only on the day they have fallen. Sweep the ground under the tree of old seed and collect freshly fallen seed the next day. Seed already on the ground is likely to have a high percentage of insect damage and should be carefully inspected before storing or transporting. (See 25).



Some species cannot be collected from the ground as seed, but as **wildings**. Wildings are newly germinated seedlings found under stands of mature trees. Forest Department nurseries often get their indigenous species this way from stands near the nurseries. These are gathered while still small and with the soil still attached to their roots. They are then transferred to pots in the nursery until ready for transplanting. This can be done for most species and is common for *Grevillea robusta*, *Olea sp.*, and *Prunus africanum*. This is also a good reason for preserving small stands of indigenous trees in your location. Often this is the best way to propagate trees difficult to grow in a nursery or with hard-to-collect seed.

SEED QUALITY AND VIABILITY

25 How can we tell if we have good seed?

The first step is visual inspection. Usually seeds that are smaller than the average, darker or lighter in colour or mis-shapen in some manner are bad and can be discarded. Insect damage occurs often and is spotted by finding a small hole in the seed coat.

For hard-coated species—acacia, podocarpus, baobab and balanites, for example—floating in water is a good test. Normally

good seed will sink and the bad float. Simply throw out the floating seed. Dry the remainder thoroughly before storing.

26 Are there differences in seed of the same species?

All seeds are not exactly alike. Those differing greatly in size, shape and colour should be discarded. Small differences create no problems for germination. As mentioned earlier, sometimes the viability of seed varies from one location to another and so acquiring or collecting from two separate locations often eliminates this problem. Be sure though, to keep the collections separate.

27 Are seeds from young trees as good as seeds from mature trees?

Not necessarily. For some species like *Leucaena leucocephala*, seed from the first season of production has a lower viability than seed of successive seasons. The major problem is knowing whether a young tree will exhibit fully the characteristics you desire. A mature tree already displays these clearly, whereas young trees are uncertain and therefore, less acceptable as seed sources.

28 How long do seeds remain viable?

This varies greatly between species. Hard-coated species: acacia, baobab, acrocarpus, podo, etc., have long viability. Some acacia may last 10 years or more—as they sometimes do in the wild—before germinating. Other seed, such as the oily ones or those with soft covers last only a short while. *Azadirachta indica* (neem) remains viable for two weeks to two months only. *Grevillea robusta* can last three months or more if kept in cold storage. Others, like *Cassia siamea* or *Balanites aegyptiaca*, lose viability slowly over a period of two years. (Where the viability duration is known it is listed in this directory under the individual species profile.)

29 What makes a seed go bad (fail to germinate)?

Oily seeds, such as neem, go bad quickly due to a breakdown and loss of oils. Nothing can be done about this. Chemical, fungal, or bacterial action damages seed as well, especially in moist conditions. Insect damage is quite common. Careless handling resulting in cracking or splitting of the seed coat, also can lower germination capacity.

30 How can a seed be stored without losing viability?

The basic rule is to keep seed as clean, cool and dry as possible. Seed should be removed from the pod, cone or fruit and dried quickly.

Some harder, larger types of seed can be washed and dried in the sun as well. Storage is best done in a metal container or paperbag and placed in a cool or cold place—at any rate away from the sun. If seed is to be stored for a long time, chemicals can be used to prevent insect attack. You should not store seed in a plastic bag as this can make seed sweat, causing it to rot or germinate prematurely. Warmth too, will result in the same problems. So always remember the cooler and drier the storage place, the better for the seed.

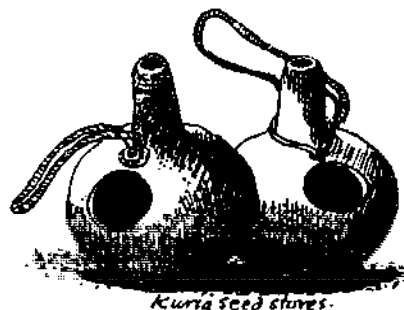
As a general rule using fresh seed is best since the longer the seed is kept the more problems it can develop.

31 Can seed quality be tested?

Yes, and this is important if you have stored seed for a while or received seed from an untested supply.

A simple testing method involves just a cloth, water and a warm place. Take a small counted number of seeds, 20, 50 or 100 and do any pre-treatment required prior to planting. (Pre-treatment techniques are given on page 18.) Put the seeds on a damp cloth in a dish or bowl. Cover with another fold of the cloth; moisten it thoroughly and put in a warm, but not hot, place. Check the seeds daily for signs of germination and keep the cloth moist. When germination begins, keep a record of the day and number. The test usually lasts two weeks but results vary according to species and length of storage. Germination of over 50% means you have good seed. Small-seeded species having only 5% germination are still worth keeping. To obtain complete results for some species like grevillea or terminalia, the test may have to go on for considerably longer than two weeks.

If you are sending the seed to someone else, you should also send your germination test results with the seed. These tests help you to determine the best method of sowing in your nursery. High germination means you can sow directly in the pots. Low germination indicates the need to use a seed-bed.



OTION OF INFORMATION ABOUT SEED

32 How do we handle information about seed?

Seed information is important especially if you are selling or sending seed to someone else. The more concise yet thorough your information the better. Information helps others determine the best time to sow the seed, what soil to plant the seedlings in and gives an idea of the kind of tree to expect. (The sample form provided at the end of chapter 6 helps you record the relevant information for others.)

33 What should you do with new information?

This book does not have complete information about each species. So if you have new, better or more information about a tree species or its seed which would add to our knowledge of the trees, it would be deeply appreciated. KENGO, CARE-Kenya, MCC, the Forest Department and the Silviculturalist at KARI are acting as channels for this information and it can be sent to any one of these groups. Good scientific knowledge of many species is scarce and your knowledge will help fill in many gaps. (see chapter 6).

34 How do we get help for tree seed problems?

This book has not answered all the possible questions about the seed, especially concerning the individual tree species. As new information is gathered, we can improve our ability to answer these questions and be a channel of information exchange about trees. Often answers to tree seed questions come from people working with trees on their own land. For example, in 1982 the Mazingira project was sowing *Podocarpus gracilior* at a nursery in Nyeri. The germination technique consisted of presoaking the seed for 24 hours. No germination resulted. The headmaster of the school where the nursery was located, then decided to grow podo as a project with his 4H club. Instead of soaking the seed, they cracked the hard outer shell lightly with a hammer. Germination was very good in a short time. This knowledge came from local people who are often the experts in tree planting.

The groups listed above (see 33) are providing a channel for this kind of information, so if you have questions, write and they will try to find the answer.

35 How are seeds posted or transported?

Within Kenya this is quite easy, especially for small quantities, since the postal service is quite good. Seeds of one species should be

packed inside a container, like a paper or cloth bag, and carefully labelled with the species name and the source. Plastic bags can be used for hard, dry seeds only if paper or cloth are not available. Do not use plastic for oily seeds like neem, because this will reduce their already short viability. These and other species, packed in separate containers, can then be placed in a cardboard box or wrapped in heavy paper. Small amounts can even be sent in an envelope, if it is sufficiently protected from leakage by double wrapping. The Tree Seed Information Form should be sent with the seeds if they are available, or you can enclose a letter containing the information.

Posting costs should be included in any price charged for the seed. Sending seeds outside the country is more complicated and should be done through groups who know the system. All seed going out of the country must be fumigated and given a phytosanitary certificate by the Kenya Government.

36 Are there quality differences within one species in seed from different regions?

Yes, see question 6. Most of these differences are not known or understood. This explains why it is wise to get seed from more than one source, especially if germination testing data are not available.

GERMINATION AND PRE-TREATMENT OF SEED

37 Do all seeds germinate?

The percentage of seeds which germinate varies greatly between species, as does the time it takes for seeds to germinate. Some species, like neem, germinate vigorously if fresh and at nearly 100% rate. Other seeds require pre-treatment of some kind before a good percentage of the seeds can sprout. Without pre-treatment some seeds may never germinate. The percentage germination results of testing are important in calculating how many seeds will be required to obtain a certain number of seedlings.

38 What kinds of pre-treatment of seeds are used?

CRACKING

There are many methods. The cracking technique used for podo mentioned earlier is one. Actually this treatment may be a copy of how nature stimulates germination. Most of the seeds monkeys crack open are swallowed. However, occasionally monkeys may allow

some seeds to drop after cracking and it is these which germinate. Podo will also germinate if left long enough in a seed-bed, but this makes for uneven seedling growth. For a small number of seeds, cracking lightly appears to be the best.

SCARIFICATION

Not all seed can or should be cracked. Other methods, also imitating nature can be used. *Scarification* is the term used by foresters for these techniques. Grazing animals like cattle, goats, camels and others often swallow seeds whole. Acid in the stomach softens the hard seed coat of acacia and other species for instance; then the seeds pass through the bowels and are deposited, with fresh fertilizer, ready to germinate. Tree planters have imitated this by soaking seed in mild acid solutions for 5 to 20 minutes before sowing. This technique is tricky and should be tried only with professional advice.

SOAKING

Soaking is another method used for bulk seed. Water is brought to a boil, then poured over the seed and allowed to stand for 5 minutes. The water is then cooled by adding cold water and the seeds are left soaking up to 24 hours. Hard seeds will swell with liquid and be ready for sowing after this.

NICKING

An efficient but time-consuming technique for hard-coated seed, consists of nicking the seed coat with a knife or fingernail clippers. Only a small nick is required. Care must be taken to avoid nicking the end of the seed where the germ is located. Tests indicate that this method leads to the best germination percentage but demands also the greatest labour input. It is recommended therefore only for small quantities of seed.

These methods work because they improve the water penetration of the seed which in turn stimulates germination. Other methods may work as well. Some seeds however, do not respond well to any techniques. *Melia volkensii* (Mukau-Kamba), a valuable tree of the semi-arid areas east of Mt Kenya, does not germinate quickly or well no matter what is done. Farmers feed the seed to goats, then burn them when they are dropped, soak them for a day or two and then sow them in an isolated spot in their compound and keep them wet. After a week, or perhaps a year or two they may germinate. Growing trees is sometimes a matter of great patience!

Most species respond well to scarification and germinate quickly. The normal length of time is two weeks. Not all seed can or should be

treated; untreated species have a broader range of germination times. (Whether or not a pre-treatment is recommended, the best type of pre-treatment, and a predicted period for germination are given in the individual tree species profiles in this book for those which are known).

39 Do young trees grow only from seed?

Though growing trees from seed is the most common technique, growing them from root suckers and cuttings is also of importance. Root suckers are the primary means of reproducing banana plants. Young plants come up around the mother plant's basal roots and are cut away for planting elsewhere. Some trees produce root suckers naturally. *Ocotea usambarensis* (camphor wood) has copious numbers of root suckers that come up after the parent tree is cut.⁴ *Melia volkensii* mentioned above, also reproduces by root suckers without the tree being felled; just cut roots a few feet from the tree and leave the cut end exposed to the surface. These suckers grow far faster than seedlings since they are connected to an already developed root system. They can be cut and transplanted like bananas.

Cuttings are an easy means of reproducing trees. A cutting is simply a section of a young branch—anywhere from 15cm to 2 metres in length—which has at least three nodes or buds. Perhaps you have witnessed the making of a fence using freshly cut logs complete with the bark. With certain species these sections sprout. That is a cutting.

To take a cutting, choose a healthy section of a parent tree. At this stage the longer the better. Strip off the leaves to prevent moisture loss through evapotranspiration, and then make a clean, slightly angled cut. Thin spindly ends can then be removed, for these grow poorly and cause moisture loss. Transport to the place you wish to plant or to the nursery. At this time you can cut the longer sections into three or more nodal lengths. Put the cutting into the soil at least two nodal lengths deep, with at least one exposed. Keep it watered until sprouting occurs and a root system has developed. (see p 92)

Trees commonly propagated this way include many members of the euphorbia family and the moracea family (figs and mulberry). A good clue is the presence of white latex sap. Other trees which reproduce this way are mentioned in the tree species section.

40 How do trees grown from root suckers or cuttings differ from those grown from seed?

Trees grown in the above manner have exactly the same traits as the parent tree. This is very important for fruit producing species since

⁴ Kenya Trees and Shrubs

you know the young tree's potential production. Date palms require reproduction from suckers to be absolutely certain that the seven-year wait for quality fruit production will not be in vain. Root suckers and cuttings are more certain methods of reproduction and often these grow faster than those from seed.

There are two main disadvantages: first, transport especially of root suckers, is more difficult and expensive per plant; second, since they carry the same genetic information, the offspring are equally susceptible to the same diseases and problems as the parent tree. The advantages usually outweigh these problems.

A SIMPLE SOIL TEST

Quite simply, soil is the top covering of earth in which plants grow. However it is made up of so many different components that it is very hard for an untrained person to know exactly their soil type. Soil type may vary within just a very short distance. There are red soils, brown soils, black-cotton soils, sandy soils, white, stony soils and many more. Within these there are variations in organic content (see mulch), acidity, salinity, nutrients and compaction, all of which have an impact on plant growth. (see glossary).

The three basic components of soil are sand, silt and clay and soil types are defined roughly by the ratio of these three ingredients. There is a simple test one can do to determine basic soil type. Take a small amount of soil and moisten it until all the particles are wet, but not so much that it will drip or run off. Then pick up a handful and squeeze. If the soil particles separate easily, with little or no stickiness, then you have a sandy soil. If all the particles stick and you can mould the soil into a desired shape, then it is a clay soil. If there is some tendency to stick, but small chunks fall off and you are unable to mould it then it is called a loamy soil.

Soil colour and its response to the addition of water will usually give sufficient clues about type for most purposes. If there are nutrient deficiencies, however, then one must consult with a trained person or have a sample tested by a laboratory. The Kenya Soil Survey people do a thorough job of this.



(Thanks to Dr. P.K. Nair of ICRAF for the simple soil test.)

CHAPTER TWO



Locational Climate Type List

Climate Zones

One of the keys to successful tree planting in Kenya, lies in selecting the correct species for the climate of your area. The first step is to identify your climate as it relates to that of other areas of Kenya. To help you do this, we have worked out a system of climate zones derived from an excellent map produced by the Kenya Soil Survey in 1983, called the *Agroclimatic Zone Map of Kenya*. This map divides Kenya into seven climate zones based on rainfall and potential evaporation. (These are defined in Table 1 page 25.) It also identifies nine temperature zones in Kenya, ranging from the cold heights of Kenya's mountains to the heat of the coast and, of the deserts. (For this, refer to Table 2 page 25.) Since the rainfall and the temperature zones overlap, this creates 33 separate agroclimatic zones.

The terminology of zones as used in the soil survey map, with its Roman and Arabic numerals, is often confusing to those who are not familiar with it. We have simplified this by combining some temperature zones together, to create 19 climate types. For each climate type we have given the name of a city, town (or two) or a rural centre which is representative of that type. This name provides a better picture of that climate than the numerical system. For those who wish to use the latter system, we have retained it in our list using all 33 agroclimatic zones. Table 3, page 26 shows the relationship between the zones and the climate types.

Your Climate Type

To find your own climate type, first find your province and your district which are listed alphabetically. Under each district, there is an alphabetical list of towns, at least one from every climate type found in that district. Your town, or one very close by, may be listed. If this is not the case, look for the town you know to be the closest climatically to your own. In the next column, the name appearing next to your own town is *your* climate type. The last column

expresses this in the numerical system.

As an example, let us say that you live in Kabiyet, Nandi District, Rift Valley Province. First find Rift Valley Province on page 32; then find Nandi District on page 34. It happens that Kabiyet is listed and its climate type is Kericho. Follow this procedure to find your own climate type.

Once you know your climate type, you can turn to Chapter 3 which will give you a list of the trees that will grow well in that climate type.



Table 1 Agroclimatic Zones I-VII

zone	r average annual rainfall mm	E° average annual potential evaporation mm	r/E° (%) classification	typical vegetation
I	1100-1700	1200-2000	80 humid	moist forest
II	1000-1600	1300-2100	65-80 sub-humid	moist to dry forest
III	800-1400	1450-2200	50-65 semi-humid	dry forest and moist woodland
IV	600-1100	1550-2200	49-50 semi-humid to semi-arid	dry woodland and bushland
V	450-900	1650-2300	25-40 semi-arid	bushland
VI	300-550	1900-2400	15-25 arid	bushland and scrubland
VII	150-350	2100-2500	15 very arid	desert scrub

Table 2 Temperature Zones 1-9

temperature zone	mean annual temperature (°)	classification	night frost	altitude (metres)	general description
9	less than 10	cold to very cold	very common	more than 3050	Afro-Alpine highlands
8	10-12	very cold	common	2750-3050	upper highlands
7	12-14	cool	occasional	2450-2750	
6	14-16	fairly cool	rare	2150-2450	lower highlands
5	16-18	cool temperate	very rare	1850-2150	
4	18-20	warm temperate	none	1500-1850	midlands
3	20-22	fairly warm	none	1200-1800	
2	22-24	warm	none	900-1200	
1	24-30	fairly hot to very hot	none	0-900	lowlands

Table 3 Agroclimatic Zones/Climate Types

Agroclimatic Zone¹		Climate Type²
Rainfall potential	Temperature	
I	3-4	Kakamega
I	5-6	Kericho
I-II	7-9	Mountain
II	1	Ramisi
II	2-3	Migori
II	4-6	Limuru
III	1	Kwale
III	2-3	Kisumu/Murang'a
III	4-5	Nairobi
III	6	Eldoret
IV	1	Lamu
IV	2-3	Lake Victoria/Thika
IV	4-6	Rumuruti/Narok
V	1-2	Taveta/Isiolo
V	3-4	Kajiado
V	5	Maralal/Naivasha
VI	1-2	Magadi/Garba Tula
VI	3-4	Kirimun
VII	1-2	Wajir

1 As defined by the *Agroclimatic Zone Map of Kenya* (See Tables 1 and 2).

2 Name given is of the city, centre, town, most representative of that climate type. For example: Migori's climate is typical of Zone II, temperature 2-3.

CENTRAL PROVINCE

DISTRICT	GEOGRAPHICAL LOCATION	CLIMATE TYPE	AGROCLIMATIC ZONE
Kiambu	Gacarage	Kericho	I,6
	Gatundu	Limuru	II,4
	Githunguri	Nairobi	III,4
	Kiambu	Nairobi	III,4
	Kijabe	Eldoret	III,6
	Kimunyu	Nairobi	III,5
	Limuru	Limuru	II,6
	Mairii	Kericho	I,6
	Mucatha	Limuru	II,5
	Muguga (West)	Nairobi	III,5
	Muguga (East)	Limuru	II,5
	Ruiru	Rumuruti/Narok	IV,4
	Thika	Lake Victoria/Thika	IV,3
Kirinyaga	Castle Forest	Kericho	I, 6
	Kagumo	Kakamega	I,4
	Kerugoya	Migori	II,3
	Kutus	Kisumu/ Murang'a	III,3
	Sagana	Kisumu/ Murang'a	III, 3
	Thika	Lake Victoria/Thika	IV, 3
Murang'a	Githunguri	Kakamega	I, 4
	Kangema	Kericho	I, 5
	Kitwa	Limuru	II, 4
	Makuyu	Kisumu/ Murang'a	III, 3
	Maragua	Kisumu/ Murang'a	III, 3
	Muruka	Nairobi	III, 4
	Murang'a Township	Kisumu/ Murang'a	III, 3
Nyandarua	Lake Ol Bolossat	Eldoret	III, 6
	Nyahururu	Limuru	II, 6
	Nyandarua	Mountain	II, 7
	Ol Kalau	Eldoret	III, 6
	South Kinangop	Mountain	II, 7
Wanjohi	Eldoret	III, 6	
Nyeri	Gatarakwa	Rumuruti/Narok	IV, 5
	Kabaru	Limuru	II, 6
	Kahigaini	Eldoret/ Nairobi	III, 5
	Kairuthi	Kericho	I, 5
	Karatina	Limuru	II, 4
	Naro Moru	Maralal/ Naivasha	V, 5
	Nyeri Township	Eldoret/ Nairobi	III, 4
	Othaya	Kakamega	I, 4

COAST PROVINCE

DISTRICT	GEOGRAPHICAL LOCATION	CLIMATE TYPE	AGROCLIMATIC ZONE
Kilifi	Arubuko Sokoke Forest	Kwale	III, 1
	Dhalado	Taveta/Isiolo	V, 1
	Ganze	Taveta/Isiolo	V, 1
	Kaloleni	Kwale	III, 1
	Kilifi	Lamu	IV, 1
	Malindi	Lamu	IV, 1
	Manyeso	Taveta/Isiolo	V, 1
Kwale	Kwale	Kwale	III, 1
	Kinagoni	Taveta/Isiolo	V, 1
	Lunga Lunga	Lamu	IV, 1
	Mkongeni	Lamu	IV, 1
	Ramisi	Ramisi	II, 1
	Shimba Hills	Kwale	III, 1
Lamu	Bodhei	Magadi/Garba Tula	VI, 1
	Kiunga	Lamu	IV, 1
	Lamu	Lamu	IV, 1
	Mangai	Taveta/Isiolo	V, 1
	Pate Island	Taveta/Isiolo	V, 1
	Witu	Lamu	IV, 1
Mombasa	Changamwe	Lamu	IV, 1
	Likoni	Kwale	III, 1
	Mombasa Island	Kwale	III, 1
Taita	Aruba Lodge	Wajir	VII, 1
	Bungute	Taveta/Isiolo	V, 1
	Mwatate	Taveta/Isiolo	V, 2
	Kitani Lodge	Magadi/Garba Tula	VI, 1
	Kamshari	Magadi/Garba Tula	VI, 1
	Taita Hills	Migori and Limuru	II, 3-4
	Taveta	Taveta/Isiolo	V, 1
	Voi	Taveta/Isiolo	V, 1
	Wundanyi	Migori	II, 3
Tana River	Garsen (North)	Magadi/Garba Tula	VI, 1
	Garsen (South)	Taveta/Isiolo	V, 1
	Hola	Magadi/Garba Tula	VI, 1
	Kora National Reserve	Magadi/Garba Tula	VI, 1
	Mutiboko	Wajir	VII, 1
	Ndeyini Pool	Wajir	VII, 1

EASTERN PROVINCE

DISTRICT	GEOGRAPHICAL LOCATION	CLIMATE TYPE	AGROCLIMATIC ZONE
Embu	Embu Township	Kisumu/Murang'a	III, 3
	Irangi	Kericho	I, 5
	Ishiaru	Lamu	IV, 1
	Kanga	Kakamega	I, 4
	Kiritiri	Lake Victoria/Thika	IV, 2
	Mashamba	Taveta/Isiolo	V, 2
	Runyenjes	Kakamega and Migori	I-II, 3
	Siakago	Lake Victoria/Thika	IV, 2
Isiolo	Garba Tula	Magadi/Garba Tula	VI, 1
	Isiolo	Taveta/Isiolo	V, 2
	Merti	Wajir	VII, 1
	Modo Gashi	Wajir	VII, 1
	Shaba National Reserve	Magadi/Garba Tula	VI, 2
Kitui	Endau	Taveta/Isiolo	V, 1
	Katse	Taveta/Isiolo	V, 1-2
	Kitui	Kisumu/Murang'a	III, 3
	Kyamatu	Magadi/Garba Tula	VI-1
	Mbuvu	Magadi/Garba Tula	VI, 1
	Migwani	Lake Victoria/Thika	IV, 2
	Mutito	Lake Victoria/Thika	IV, 2
	Mutumo	Taveta/Isiolo	V, 1
	Mwingi	Taveta/Isiolo	V, 2
	Nguni	Taveta/Isiolo	V, 1
	Tulia	Lake Victoria/Thika	IV, 2
Machakos	Chyulu Range (1600m)	Limuru	II, 4
	Chyulu Range (1200-1600m)	Kisumu/Murang'a	III, 3
	Chyulu Range (below 1200m)	Lake Victoria/Thika	IV, 2
	Kabaa	Kajiado	V, 3
	Kangundo	Nairobi	III, 4 (IV, 3)
	Kiatineni	Kajiado	V, 3
	Kibwezi	Taveta/Isiolo	V, 2
	Machakos	Rumuruti/Narok	IV, 4
	Maiaini	Lake Victoria/Thika	IV, 2
	Makindu	Taveta/Isiolo	V, 2
	Makueni	Taveta/Isiolo	V, 2
	Masinga	Taveta/Isiolo	V, 2
	Mbooni	Nairobi	III, 4
	Mtito Andei	Magadi/Garba Tula	VI, 1
	Mubuni	Taveta/Isiolo	V, 2
	Sultan Hamud	Kajiado	V, 3

Marsabit	Dabel	Wajir	VII, 1	
	Huri Hills	Taveta/Isiolo	V, 3(VI, 2)	
	Ileret	Wajir	VII, 1	
	Kargi	Wajir	VII, 1	
	Losai National Reserve	Wajir	VII, 1	
	Marsabit Peak	Kisumu, Murang'a	III, 3	
	Marsabit Town	Lake Victoria/Thika	IV, 3	
	Mount Kulal	Nairobi	III, 5(IV, 4)	
	Moyale	Taveta/Isiolo	V, 2	
	North Horr	Wajir	VII, 1	
	N. W. North Horr	Wajir	VII, 2	
	Sololo	Taveta/Isiolo	V, 1	
	East Rudolf National Park	Wajir	VII, 1	
	Meru	Chiakariga	Lamu	IV, 1
		Chogoria	Kakamega	I, 4
		Chuka	Kakamega	I, 3
Gatunga		Lamu	IV, 1	
Giaki		Migori	II, 2	
Kalangachini		Magadi/Garba Tula	VI, 1	
Lembolio		Taveta/Isiolo	V, 2	
Magutumi		Migori	II, 2	
Maua		Kericho	I, 5	
Meru		Kakamega	I, 4	
Meru National Park		Magadi/Garba Tula	VI, 1	
Mukinduri		Kakamega	I, 4	
Mitunguu		Kisumu/Murang'a	III, 2(II, 2)	
Nkubu		Kakamega	I, 3	
Timau		Rumuruti/Narok	IV, 6	
Tunyai	Kisumu/Murang'a	III, 2		

NAIROBI PROVINCE

DISTRICT	GEOGRAPHICAL LOCATION	CLIMATIC TYPE	AGROCLIMATIC ZONE
Nairobi	Dagoretti	Nairobi	III, 4
	Kassarani	Rumuruti/Narok	IV, 4
	Kibera	Nairobi	III, 5
	Makandara	Rumuruti/Narok	IV, 4
	Pumwani	Nairobi	III, 4

NORTH EASTERN PROVINCE

DISTRICT	GEOGRAPHIC LOCATION	CLIMATE TYPE	AGROCLIMATIC ZONE
Garissa	Dadaab	Wajir	VII, 1
	Garissa	Wajir	VII, 1
	Ijara	Magadi/Garba Tula	VI, 1
	Kolobio	Magadi/Garba Tula	VI, 1
	Mbalambula	Wajir	VII, 1
	Arawale National Reserve	Magadi/Garba Tula	VI, 1
Mandera	Arabia	Wajir	VII, 1
	Elwak	Wajir	VII, 1
	Mandera	Wajir	VII, 1
	Rhamu	Wajir	VII, 1
	Takaba	Wajir	VII, 1
Wajir	Buna	Wajir	VII, 1
	Gurar	Magadi/Garba Tula	VI, 1
	Tarbaj	Wajir	VII, 1
	Wajir	Wajir	VII, 1

NYANZA PROVINCE

DISTRICT	GEOGRAPHICAL LOCATION	CLIMATE TYPE	AGROCLIMATIC ZONE
Kisii	Keberigo	Kericho	I, 5
	Keroka	Kericho	I, 5
	Kisii	Kakamega	I, 4
	Nyambaria	Kericho	I, 5
	Nyangusu	Kericho	I, 5
	Ogembo	Kakamega	I, 4
	Riosiri	Kakamega	I, 4
	Kisumu	Ahero	Kisumu/Murang'a
Kibos		Migori	II, 3
Kisumu		Kisumu/Murang'a	III, 3
Kusa		Kisumu/Murang'a	III, 3
Maseno		Kakamega	I, 3-4
Miwani		Migori	II, 3
Muhoroni		Limuru	II, 4

Siaya	Akala	Migori	II, 3
	Asembo Bay	Kisumu/Murang'a	III, 3(IV, 3)
	Bondo	Kisumu/Murang'a	III, 3
	Jera	Kakamega	I, 3
	Ndori-Ramba	Kisumu/Murang'a	III, 3 (II, 3)
	Port Southby	Lake Victoria/Thika	IV, 3
	Siaya Town	Migori	II, 3
	Ukwala	Kakamega	I, 3
	Usenge	Lake Victoria/Thika	IV, 3
	Rageng'ni	Lake Victoria/Thika	IV, 3
	Yala	Kakamega	I, 3
	South Nyanza	Bande	Kisumu/Murang'a
Homa Bay		Kisumu/Murang'a	III, 3
Isebania		Kakamega	I, 4
Karungu		Lake Victoria/Thika	IV, 3
Kendu Bay		Kisumu/Murang'a	III, 3
Kihancha		Migori	II, 3
Macalder		Kisumu/Murang'a	III, 3
Mbita		Lake Victoria/Thika	IV, 3
Mfangano Island		Lake Victoria/Thika	IV, 3
Migori		Migori	II, 3
Oyugis		Migori	II, 3
Rangwe		Migori	II, 3
Rongo		Kakamega	I, 3
Rusinga Island		Lake Victoria/Thika	IV, 3
Lambwe Valley Game Reserve		Kisumu/Murang'a	III,3

RIFT VALLEY PROVINCE

DISTRICT	GEOGRAPHICAL LOCATION	CLIMATE TYPE	AGROCLIMATIC ZONE
Baringo	Bartabwa	Rumuruti/Narok	IV, 4
	Cheptembas	Nairobi	III, 3
	Kabarnet	Limuru	II, 3
	Kapedo	Magadi/Garba Tula	V, 1
	Kimose	Lake Victoria/Thika	IV, 3
	Kolowa	Magadi/Garba Tula	VI, 2
	Lake Baringo	Taveta/Isiolo	V, 2
	Marigat	Taveta/Isiolo	V, 2
	Nginyang	Taveta/Isiolo	V, 2
	Sacho	Limuru	II, 4
	Tangulbei	Taveta/Isiolo	V, 2

Elgeyo Marakwet	Chebiemit	Limuru	II, 6	
	Cheptongei	Mountain	I, 7(II,6)	
	Chesetan	Lake Victoria/Thika	IV, 3	
	Iten	Limuru	II, 6	
	Chesoi	Limuru	II, 6	
	Kapkenda	Mountain	I, 7	
	Kapsowar	Limuru	II, 6	
	Tambach	Nairobi	III, 5	
	Toi	Taveta/Isiolo	V, 2	
	Cherangani Hills	Mountain	I, 8-9	
Kajiado	Amboseli National Park	Magadi/Garba Tula	VI, 1	
	Chyulu Hills (above 1600m)	Limuru	II, 4	
	Chyulu Hills (1200-1600)	Kisumu/Murang'a	III, 3	
	Chyulu Hills (below 1200)	Lake Victoria/Thika	IV, 2	
	Kajiado	Kajiado	V, 4	
	Kedong	Kajiado	V, 3	
	Kibini	Kajiado	V, 3	
	Kimana	Kajiado	V, 3	
	Kiserian	Rumuruti/Narok	IV, 5	
	Magadi	Magadi/Garba Tula	IV, 1	
	Mukutano	Magadi Gaba Tula	VI, 2	
	Naimanga	Rumuruti/Narok	IV, 5	
	Ngong	Rumuruti/Narok	IV, 5(III, 6)	
	Oloitokitok	Rumuruti/Narok	IV, 4	
	Ologasailie	Taveta/Isiolo	V, 2	
	Kericho	Kaboson	Eldoret/Nairobi	III, 5
		Kapkatet	Kericho	I, 5
		Kericho	Kericho	I, 5
		Kiplelji	Limuru	II, 5
Kipkelion		Limuru	II, 5	
Koituuy		Limuru	II, 4	
Londiani		Limuru	II, 6	
Sigor		Limuru (Eldoret)	II, 4 (III, 4)	
Sotik		Limuru	II, 5	
South-western Mau Forest		Kericho	I, 6	
Tenwek		Limuru	II, 6	
Laikipia		Don Dol	Maralal/Naivasha	V, 5
		Kirimun	Kirimun	VI, 4
		Laragai	Maralal/Naivasha	V, 5
	Mukenya	Kajiado	V, 4	
	Mukogodo	Maralal/Naivasha	V, 5	
	Mutara Ranch	Kajiado	V, 4	
	Nanyuki	Rumuruti/Narok	IV, 5	
	Ng'arua	Eldoret	III, 6	
	Ngobit	Maralal/Naivasha	V, 5	

	Ol-Moran	Maralal/Naivasha	V, 5
	Rumuruti	Rumuruti/Narok	IV, 5
	Sipili	Rumuruti/Narok	IV, 5
	Solai	Nairobi	III, 4
	Tandaro	Nairobi	III, 5
Nakuru	Elburgon	Limuru	II, 6
	Elementaita	Rumuruti/Narok	IV, 5
	Gilgil	Maralal/Naivasha	V, 5
	Kiambogo	Eldoret	III, 6
	Lake Naivasha	Maralal/Naivasha	V, 5
	Longonot Statellite Station	Maralal/Naivasha	V, 5
	Mau Narok	Mountain	I, 8
	Menengai Crater	Eldoret	III, 6
	Molo	Mountain	II, 7
	Mount Longonot	Rumuruti/Narok	IV, 6
	Naivasha	Maralal/Naivasha	V, 5
	Nakuru	Nairobi	III, 5
	Njoro	Nairobi	III, 5
	Rongai	Nairobi	III, 5
	Subukia	Limuru	II, 5
Nandi	Chepterwai	Kakamega and Kericho	I, 4-5
	Kabiyet	Kericho	I, 5
	Kaiboi	Limuru	II, 5
	Kapsabet	Kericho	I, 5
	Koiprak	Kakamega	I, 4
	Nandi Hills	Kericho	I, 5
	Tinderet	Mountain	I, 7
Narok	Entasekera	Eldoret	II, 6
	Kameube	Limuru	II, 4
	Kilgoris	Kericho (Limuru)	I, 5(II, 4)
	Lemek	Rumuruti/Narok	IV, 5
	Loita Hills	Eldoret	III, 6
	Logorien	Limuru	II, 4
	Masai Mara Game Park	Rumuruti/Narok	IV, 4
	Moriyo	Rumuruti/Narok	IV, 6
	Narok	Rumuruti/Narok	IV, 5
	Narosura	Maralal/Naivasha	V, 5
	Ntulelei	Eldoret	III, 6
	Olmesutye	Nairobi	III, 5
	Ol Pusimoru Forest — (lower)	Limuru	II, 6
	Ol Pusimoru Forest — (upper)	Mountain	I, 7-8
	Ongata Naado	Kajiado	V, 4
	Trans Mara Forest	Kericho	I, 6

Samburu	Baragoi	Maralal/Naivasha	V, 5
	Lerochi Forest	Eldoret & Rumuruti/ Narok	III, 6 (IV, 5)
	Maralal	Maralal/Naivasha	V, 5
	Marti	Maralal/Naivasha	V, 5
	Mathew's Range Forest (1800 m)	Eldoret	III, 6
	Mathew's Range Forest (1200m-1800 m)	Rumuruti/Narok	IV, 4-5
	Mathew's Range Forest (below 1200m)	Taveta/Isiolo	V, 2
	Mount Nyiro Forest	(same as above)	III, 6 to V, 2
	Samburu National Reserve	Magadi/Garba Tula	VI, 2
	South Horr	Kajiado	V, 4
	South South Horr	Kirimun	VI, 3
	Sware	Magadi/Garba Tula	VI, 2
	Wamba	Lake Victoria (Taveta/Isiolo)	IV, 3 (V, 2)
Trans Nzoia	Cherangani	Eldoret	III, 6
	Endebess	Nairobi	III, 5
	Kitale	Nairobi	III, 5
	Kiminini	Limuru	II, 4
	Kimothon	Limuru	II, 6
	Kipsain	Nairobi	III, 5
	Mount Elgon National Park	Mountain	I, 7-9
	Saboti	Limuru	II, 5
	Uasin Gishu	Kakuma	Magadi/Garba Tula
Labatin Plains		Magadi/Garba Tula	VI, 1
Lodwar		Wajir	VII, 1
Lokichar		Wajir	VII, 1
Lokichokio		Magadi/Garba Tula	VI, 1
Lokitaung		Wajir	VII, 1
Lomelo		Wajir	VII, 1
Lotikipi Plain		Wajir	VII, 1
Mogila		Taveta/Isiolo	V, 2
Muru-erith		Kajiado	V, 3
Puch Prasir Plateau		Rumuruti/Narok	IV, 4
Songat Mountain		Kajiado	V, 3
Uasin Gishu		Eldoret	Eldoret
	Kasurur	Nairobi	III, 5
	Kaptagat	Limuru	II, 6
	Moiben	Eldoret	III, 6
	Onyoki	Limuru	II, 6
	Soy	Limuru	II, 5
	Timboroa	Mountain	I, 7
	Turbo	Limuru	II, 5

West Pokot	Atale	Rumuruti/ Narok	IV, 5
	Cheburua	Eldoret and	
		Rumuruti/ Narok	III, 6 (IV, 5)
	Cherangani Hills	Mountain	I, 7-9
	Kapenguria	Limuru	II, 6
	Kokusan	Kajiado	V, 3
	Kongolai	Lake Victoria/Thika	IV, 3
	Kotolpa	Taveta/ Isiolo	V, 2
	Matembur	Nairobi	III, 4
	Pokot Plains	Magadi/Garba Tula	VI, 1
	Ptoyo	Nairobi	III, 5
	Raina	Lake Victoria/Thika	IV, 3
	Sigor	Lake Victoria/Thika	IV, 3
Sogoyowa	Limuru	II, 6	

WESTERN PROVINCE

DISTRICT	GEOGRAPHICAL LOCATION	CLIMATE TYPE	AGROCLIMATIC ZONE
Bungoma	Bungoma	Kakamega	I, 3
	Kapkateny	Kakamega	I, 4
	Kaptalelia	Kericho	I, 5
	Kimilili	Limuru	II, 4
	Malakisi	Migori	II, 3
	Mount Elgon Forest	Mountain	I, 7-9
	Wamono	Kakamega	I, 3
	Webuye	Kakamega	I, 3
Busia	Amukura	Kakamega	I, 3
	Bumala	Kakamega	I, 3
	Busia	Kakamega	I, 3
	Cheletemu	Migori	II, 3
	Malaba	Migori	II, 3
	Nangina	Migori	II, 3
	Port Bunyala	Lake Victoria/Thika	IV, 3
	Sio Port	Kisumu/ Murang'a	III, 3
Kakamega	Butere	Kakamega	I, 3
	Kaimosi	Kakamega	I, 4
	Kakamega	Kakamega	I, 3
	Kakamega Forest	Kakamega	I, 4
	Luanda	Kakamega	I, 3
	Lugari	Kakamega	I, 4
	Mumias	Kakamega	I, 3
	Vihiga	Kakamega	I, 3

CHAPTER THREE



Climate Type/Tree Species List

The climate types in this chapter are given in the same order as in Table 3, Chapter 2. Under each is a list of the trees known to grow in that climate type. Most of the trees on these lists are examined in Chapter 4 under individual profiles. Those listed but do not appear in the profiles are given in parentheses. The trees listed here are not the only ones which grow in that climate type. Kenya has hundreds of indigenous species and many exotic and fruit trees which are not listed.

You will see a * after some of the species. This indicates that this particular climate type is a *climax zone* for the species. It is in a climax zone that the tree attains maximum growth. The * also indicates that indigenous trees once grew in this zone abundantly.

Some trees may have more than one climax zone; for example, *Brachyleana hutchinsii* (page 75) has a * in the Kwale and Nairobi climate types. These two types have similar rainfall amounts although Nairobi type is much cooler, the tree does well in both. If you wish to grow a tree, obtain seed from sources in the climate type nearest to your own.

From this list of tree species you can find a number of trees in Chapter 4, which you may wish to grow. If they are on the list under your climate type, they will grow in your home area without irrigation.



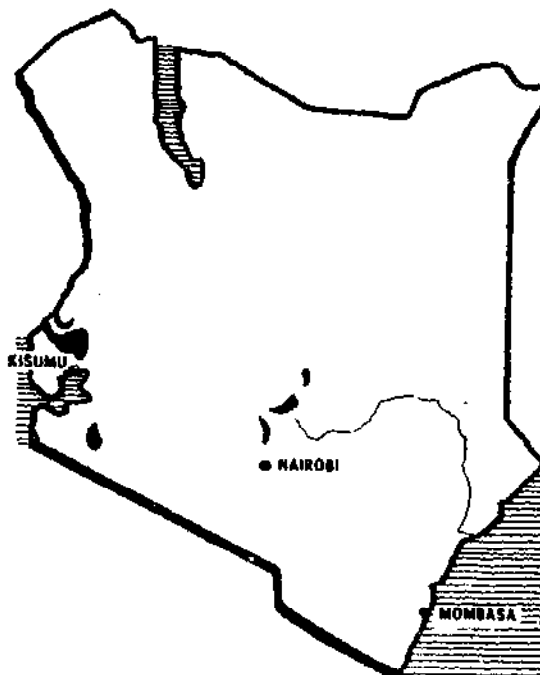
(The sources of information for this section include: *Kenya Trees and Shrubs*; Forest Department inventory data; the Ministry of Energy personnel; the East Africa Herbarium and its staff in Nairobi and field observations on a limited scale.)

General description:

High potential midlands with plenty of rainfall and very humid. The major cash crop is sugar cane.

Fruits which can be grown:

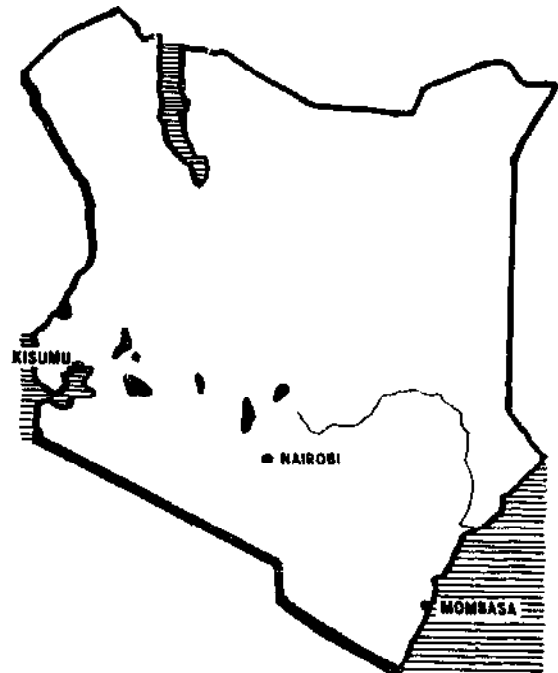
Avocado
Guava
Lemon
Lime
Macadamia
Mandarin
Mulberry
Orange
Pawpaw

**Trees known to grow in the zone:**

<i>Aberia caffra</i>	<i>Harungana madagascarensis*</i>
<i>Acacia abyssinica</i>	<i>Maesopsis eminii</i>
<i>Acacia lahai</i>	<i>Markhamia platycalyx*</i>
<i>Acacia polyacantha</i>	<i>Ocotea usambarensis</i>
<i>Albizia coriaria</i>	<i>Olea welwitschii*</i>
<i>Albizia gummifera*</i>	<i>Prunus africanum*</i>
<i>Albizia zygia*</i>	<i>Sesbania sesban</i>
<i>Antiaris toxicaria</i>	<i>Spathodea nilotica</i>
<i>Bridelia micrantha</i>	<i>Teclea nobilis</i>
<i>Calodendrum capense</i>	<i>Vitex keniensis</i>
<i>Casuarina cunninghamiana*</i>	<i>Warburgia ugandensis</i>
<i>Chlorophora excelsa*</i>	
<i>Cordia abyssinica*</i>	
<i>Erythrina abyssinica</i>	
<i>Eucalyptus microcorys*</i>	
<i>Eucalyptus paniculata*</i>	
<i>Eucalyptus saligna*</i>	
<i>Faurea saligna</i>	
<i>Ficus natalensis*</i>	
<i>Gliricidia sepium*</i>	
<i>Gmelina arborea</i>	
<i>Grevillea robusta</i>	

General description:

This type lies above the normally cropped areas. It is cool, wet with sometimes frequent frosts. Often dominated by bamboo and podocarpus forests.



Trees known to grow in the zone:

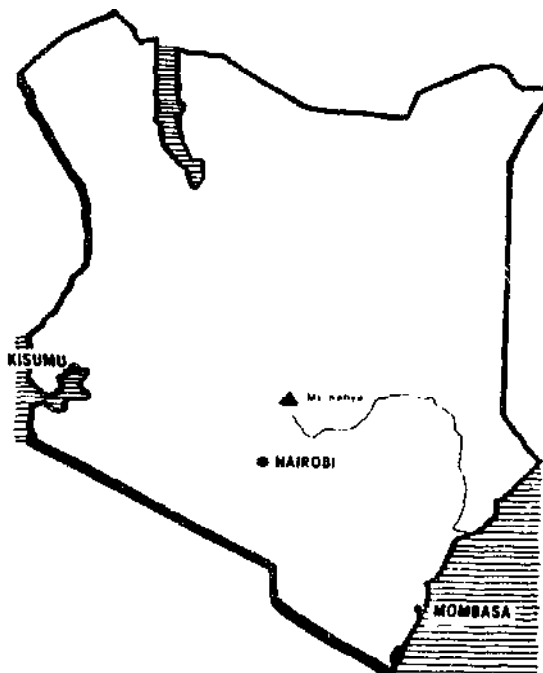
- Acacia abyssinica*
- Acacia lahai**
- Dombeya goetzenii**
- Eucalyptus regnans*
- Podocarpus millanjianus**
- Polyscias kikuyuensis**
- Prunus africanum*
- Teclea nobilis**

General description:

A small climate type found only at the coast near the Tanzanian border. The land is high potential excellent for fruits.

Fruits which can be grown:

Avocado
Cashew nut
Coconut
Grapefruit
Guava
Lemon
Lime
Mandarin
Mango
Orange
Pawpaw

**Trees known to grow in the zone:**

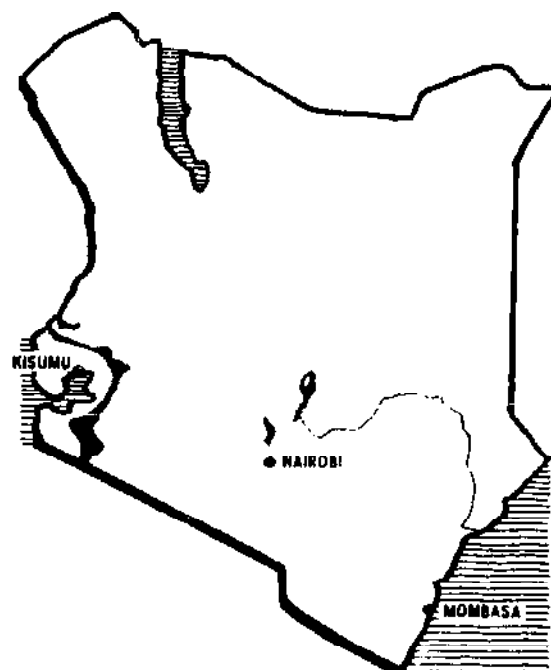
Acacia polyacantha
*Azalia cuanzensis**
Antiaris toxicaria
Brachyleana hutchinsii
Bridelia micrantha
*Casuarina equisetifolia**
*Chlorophora excelsa**
Erythrina abyssinica
Eucalyptus camaldulensis
Eucalyptus saligna
*Gliricidia sepium**
*Gmelina arborea**
Leucaena leucocephala
Sesbania sesban
Spathodea nilotica
*Borassus aethiopum**

General description:

Similar to but slightly drier than Kakamega Type. Sugar cane is the dominant cash crop.

Fruits which can be grown:

Avocado
Grapefruit
Guava
Lemon
Macadamia
Mandarin
Mango
Mulberry
Orange
Pawpaw

**Trees known to grow in the zone:**

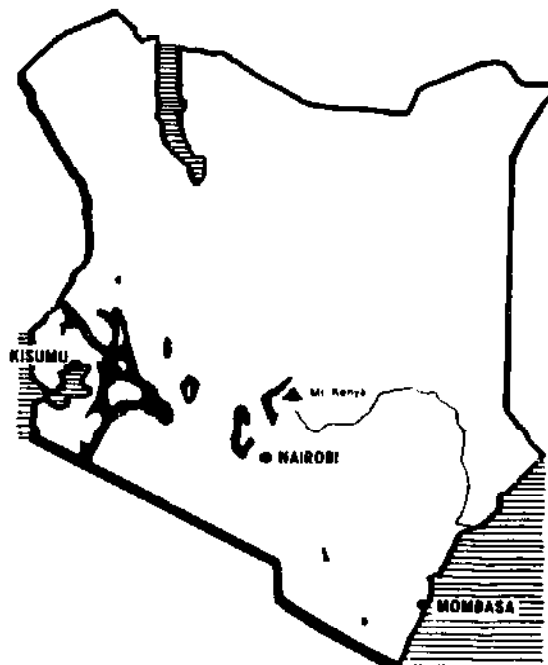
<i>Aberia caffra</i>	<i>Gmelina arborea*</i>
<i>Acacia gerrardii</i>	<i>Grevillea robusta*</i>
<i>Acacia polyacantha</i>	<i>Harungana madagascarensis</i>
<i>Acrocarpus fraxinifolia</i>	<i>Leucaena leucocephala</i>
<i>Albizia coriaria*</i>	<i>Maesopsis eminii*</i>
<i>Albizia gummifera</i>	<i>Markhamia hildebrandtii</i>
<i>Albizia zygia</i>	<i>Markhamia platycalyx*</i>
<i>Antiaris toxicaria*</i>	<i>Ocotea usambarensis</i>
<i>Brachyleana hutchinsii</i>	<i>Olea welwitschii</i>
<i>Bridelia micrantha*</i>	<i>Piliostigma thongingii</i>
<i>Calodendrum capense</i>	<i>Sesbania sesban*</i>
<i>Cassia siamea</i>	<i>Spathodea nilotica</i>
<i>Casuarina cunninghamiana</i>	<i>Vitex keniensis</i>
<i>Chlorophora excelsa*</i>	<i>Warburgia ugandensis</i>
<i>Cordia abyssinica*</i>	
<i>Croton megalocarpus</i>	
<i>Erythrina abyssinica</i>	
<i>Eucalyptus microcorys</i>	
<i>Eucalyptus saligna*</i>	
<i>Faurea saligna</i>	
<i>Ficus natalensis*</i>	
<i>Gliricidia sepium*</i>	

General description:

In this zone coffee is the major cash crop, not requiring irrigation. It is cool, moist with generally constant rainfall.

Fruits which can be grown:

Lemon
Guava
Macadamia
Mulberry
Pawpaw
Orange
Plum

**Trees known to grow in the zone:**

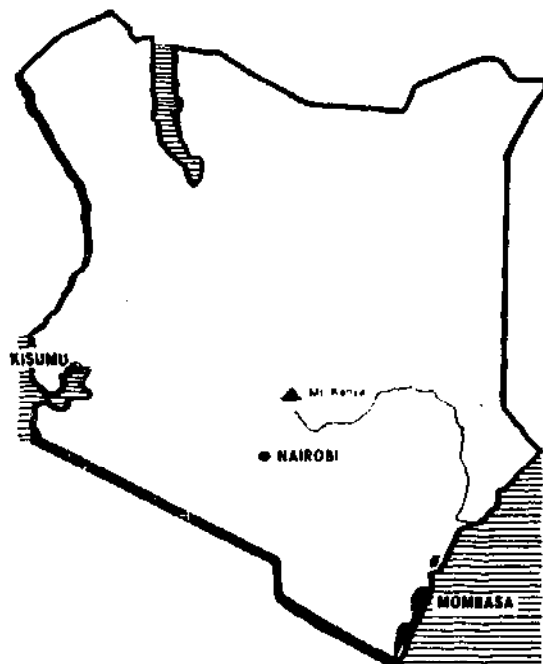
<i>Aberia caffra</i>	<i>Grevillea robusta*</i>
<i>Acacia abyssinica*</i>	<i>Harungana madagascarensis*</i>
<i>Acacia gerrardii</i>	<i>Juniperus procera</i>
<i>Acacia lahai</i>	<i>Maesopsis eminii*</i>
<i>Acrocarpus fraxinifolia*</i>	<i>Markhamia hildebrandtii</i>
<i>Albizia coriaria</i>	<i>Markhamia platycalyx*</i>
<i>Albizia gummifera*</i>	<i>Ocotea usambarensis</i>
<i>Albizia zygia*</i>	<i>Olea africana</i>
<i>Antiaris toxicaria*</i>	<i>Olea hochstetteri*</i>
<i>Brachyleana hutchinsii</i>	<i>Olea welwitschii</i>
<i>Bridelia micrantha</i>	<i>Piliostigma thonningii</i>
<i>Calodendrum capense</i>	<i>Podocarpus gracilior</i>
<i>Casuarina cunninghamiana*</i>	<i>Podocarpus millanjianus</i>
<i>Cordia abyssinica*</i>	<i>Polyscias kikuyuensis</i>
<i>Croton megalocarpus*</i>	<i>Prunus africanum</i>
<i>Dombeya goetzenii</i>	<i>Sesbania sesban</i>
<i>Erythrina abyssinica</i>	<i>Spathodea nilotica*</i>
<i>Eucalyptus microcorys*</i>	<i>Teclea nobilis*</i>
<i>Eucalyptus paniculata</i>	<i>Vitex keniensis</i>
<i>Eucalyptus saligna*</i>	<i>Warburgia ugandensis*</i>
<i>Faurea saligna</i>	
<i>Ficus natalensis</i>	

General description:

The hot, sub-humid climate area north and south of Mombasa. Dominant cash crops include coconut, cashews and mangoes.

Fruits which can be grown:

Avocado
Cashew nut
Coconut
Grapefruit
Guava
Lemon
Lime
Mandarin
Mango
Orange
Pawpaw

**Trees known to grow in the zone:**

*Acacia albida**
Acacia nilotica
Acacia polyacantha
Acacia seyal
Acacia tortilis
Adansonia digitata
*Azalia cuanzensis**
Antiaris toxicaria
Azadirachta indica
Balanites aegyptiaca
Borassus aethiopum
*Brachyleana hutchinsii**
*Bridelia micrantha**
Cassia siamea
*Casuarina equisetifolia**
Chlorophora excelsa
*Conocarpus lancifolia**
*Combretum schumanii**
Dalbergia melanoxylon
Erythrina abyssinica
Eucalyptus camaldulensis
Eucalyptus microtheca

*Gliricidia sepium**
*Gmelina arborea**
Hyphaena coriacea
Leucaena leucocephala
Prosopis juliflora
Sesbania sesban
Spathodea nilotica

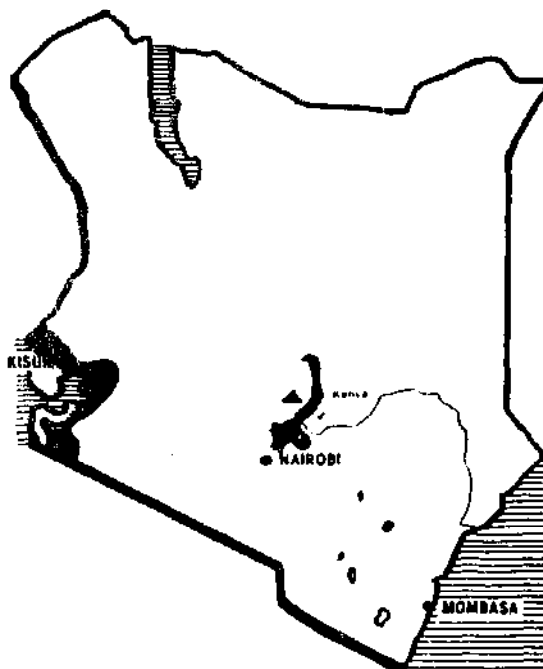
KISUMU/MURANG'A TYPE (Zone III, 2-3)

General description:

Sub-humid medium potential agricultural area with cotton, tobacco and sunflowers as the major cash crops.

Fruits which can be grown:

Avocado
Cashew nut
Coconut
Grapefruit
Guava
Lemon/ Lime
Mandarin/ Orange
Mango
Mulberry
Pawpaw



Trees known to grow in the zone:

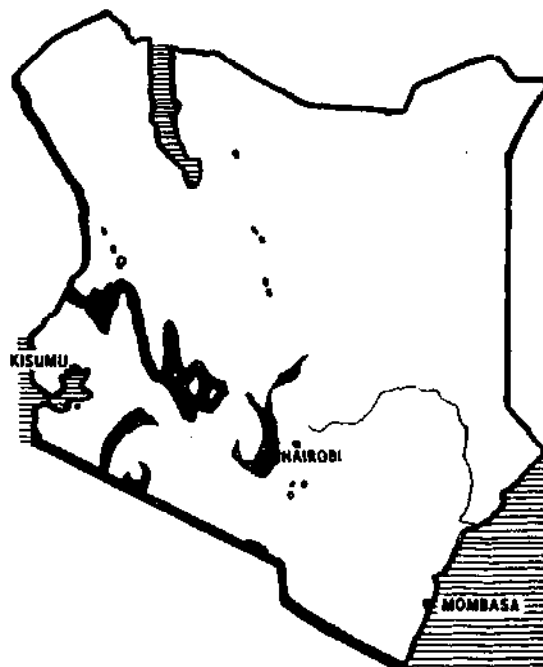
Acacia albida*	Croton megalocarpus
Acacia gerrardii	Erythrina abyssinica
Acacia nilotica	Eucalyptus camaldulensis
Acacia polyacantha	Eucalyptus citriodora*
Acacia seyal	Eucalyptus microtheca
Acacia tortilis	Eucalyptus saligna
Albizia coriaria*	Faurea saligna
Albizia gummifera	Ficus natalensis
Albizia zygia	Gliricidia sepium*
Antiaris toxicaria	Gmelina arborea
Azadirachta indica	Grevillea robusta*
Balanites aegyptiaca	Harungana madagascarensis
Borassus aethiopum*	Hyphaena coriacea
Brachyleana hutchinsii	Leucaena leucocephala*
Bridelia micrantha*	Maesopsis eminii
Calodendrum capense	Markhamia platycalyx*
Cassia siamea*	Piliostigma thonningii
Casuarina equisetifolia*	Prosopis juliflora
Chlorophora excelsa	Sesbania sesban
Conocarpus lancifolia	Tamarindus indica
Cordia abyssinica	Terminalia brownii
Combretum schumanii	Warburgia ugandensis

General description:

Marginal coffee zone. Not requiring irrigation in good rainfall years. It is sub-humid, with mild temperatures and about 1000 mm rainfall.

Fruits which can be grown:

Guava
Lemon
Lime
Loquat
Mulberry
Orange
Pawpaw

**Trees known to grow in the zone:**

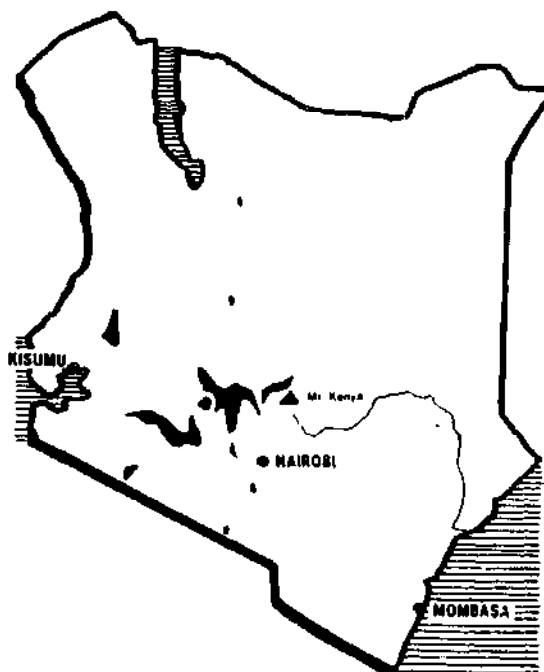
<i>Aberia caffra</i> *	<i>Ficus natalensis</i>
<i>Acacia abyssinica</i> *	<i>Grevillea robusta</i> *
<i>Acacia gerrardii</i> *	<i>Harungana madagascarensis</i>
<i>Acacia lahai</i>	<i>Juniperus procera</i> *
<i>Acacia nilotica</i>	<i>Markhamia hildebrandtii</i> *
<i>Acacia seyal</i>	<i>Markhamia platycalyx</i>
<i>Albizia coriaria</i>	<i>Ocotea usambarensis</i>
<i>Albizia gummifera</i> *	<i>Olea africana</i>
<i>Albizia zygia</i>	<i>Olea hochstetteri</i>
<i>Balanites aegyptiaca</i>	<i>Piliostigma thonningii</i>
<i>Brachyleana hutchinsii</i> *	<i>Podocarpus gracilior</i> *
<i>Calodendrum capense</i> *	<i>Prunus africanum</i>
<i>Cassia spectabilis</i>	<i>Sesbania sesban</i>
<i>Casuarina cunninghamiana</i> *	<i>Spathodea nilotica</i>
<i>Cordia abyssinica</i> *	<i>Teclea nobilis</i>
<i>Croton megalocarpus</i> *	<i>Warburgia ugandensis</i> *
<i>Erythrina abyssinica</i>	
<i>Eucalyptus citriodora</i> *	
<i>Eucalyptus microcorys</i> *	
<i>Eucalyptus paniculata</i> *	
<i>Eucalyptus saligna</i> *	
<i>Faurea saligna</i>	

General description:

Drier highlands with juniperus, *Olea africana*. and *Podocarpus gracilior* as the major natural forest types. Black wattle is a major cash crop here.

Fruits which can be grown:

- (Apple)
- (Mountain paw paw)
- (Pear)
- (Plum)

**Trees known to grow in the zone:**

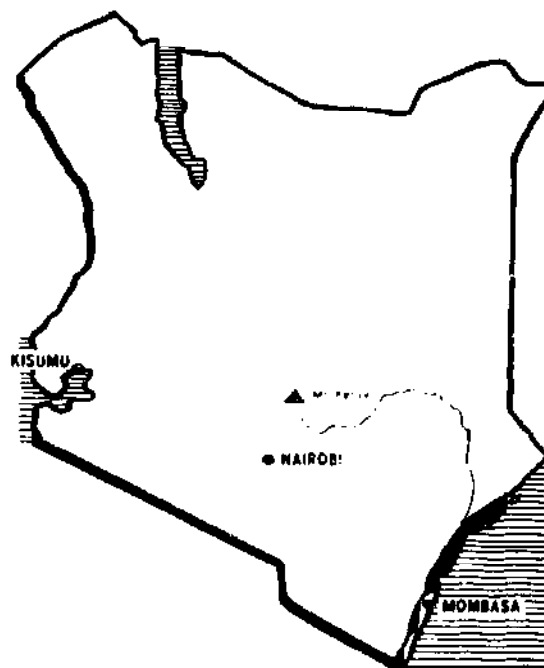
- Aberia caffra
- Acacia abyssinica
- Acacia lahai*
- Albizia gummifera
- Calodendrum capense*
- Casuarina cunninghamiana*
- Cordia abyssinica
- Croton megalocarpus*
- Erythrina abyssinica
- Eucalyptus microcorys*
- Eucalyptus paniculata
- Eucalyptus saligna*
- Faurea saligna
- Grevillea robusta
- Juniperus procera*
- Ocotea usambarensis
- Olea africana*
- Podocarpus gracilior*
- Prunus africanum
- Teclea nobilis
- Warburgia unguandensis

General description:

A drier coastal climate type, marginal for coconut, but fine for cashew and mangoes. Contains considerable natural mangrove and forest areas.

Fruits which can be grown:

Cashew nut
Coconut
Date Palm
Guava
Lemon
Lime
Mango
Pawpaw

**Trees known to grow in the zone:**

Acacia albida	Melia volkensii
Acacia elatior	Moringa stenopetala
Acacia nilotica	Parkinsonia aculeata
Acacia polyacantha*	Prosopis juliflora
Acacia senegal	Salvadora persica
Acacia seyal	Tamarindus indica*
Acacia tortilis	Terminalia prunioides*
Adansonia digitata*	Terminalia spinosa
Azadirachta indica*	Hyphaena coriacea
Balanites aegyptiaca*	
Borassus aethiopum	
Brachyleana hutchinsii*	
Cassia siamea	
Casuarina equisetifolia*	
Combretum schumanii*	
Conocarpus lancifolia*	
Dalbergia melanoxylon*	
Erythrina abyssinica	
Eucalyptus camaldulensis*	
Eucalyptus microtheca*	
Leucaena leucocephala	

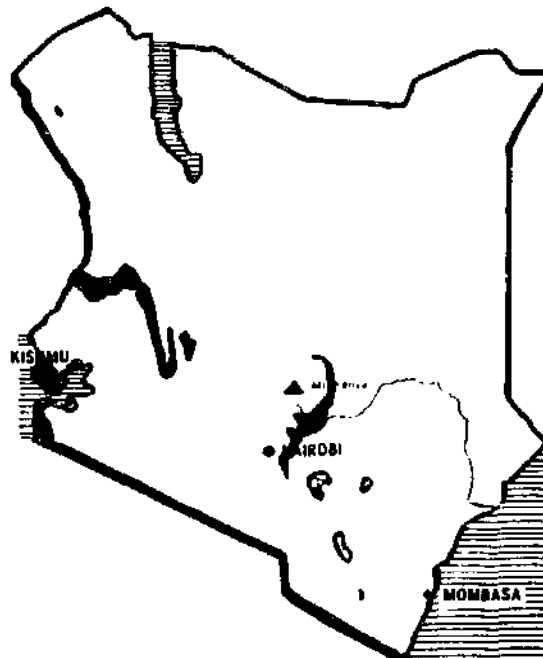
LAKE VICTORIA/THIKA TYPE (Zone IV, 2-3)

General description:

Dry, sub-humid climate with frequent rain failures for maize crops. Cash crops like coffee require irrigation. Cassava and sorghum provide the best food crops.

Fruits which can be grown:

Cashew nut
Coconut
Date Palm
Guava
Lemon
Lime
Mango
Mulberry



Trees known to grow in the zone:

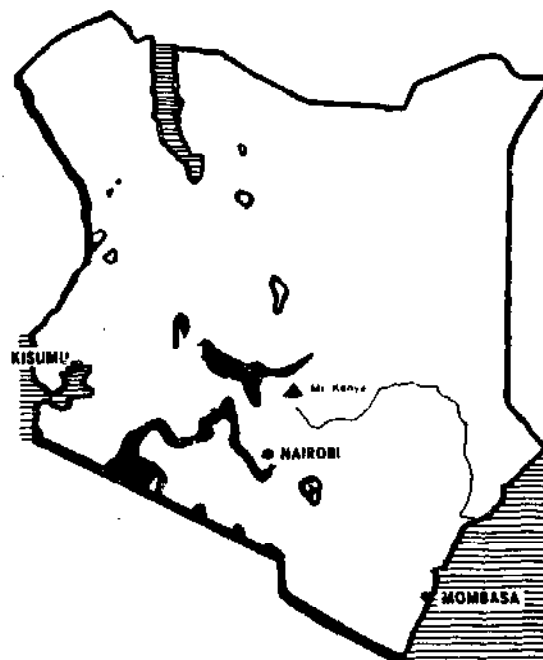
<i>Acacia albida</i> *	<i>Leucaena leucocephala</i>
<i>Acacia elatior</i>	<i>Markhamia hildebrandtii</i>
<i>Acacia nilotica</i>	<i>Markhamia platycalyx</i>
<i>Acacia polyacantha</i> *	<i>Melia volkensii</i> *
<i>Acacia senegal</i>	<i>Moringa stenopetala</i>
<i>Acacia seyal</i> *	<i>Parkinsonia aculeata</i>
<i>Acacia tortilis</i>	<i>Piliostigma thonningii</i>
<i>Adansonia digitata</i>	<i>Prosopis chilensis</i>
<i>Albizia coriaria</i>	<i>Prosopis juliflora</i>
<i>Azadirachta indica</i>	<i>Salvadora persica</i>
<i>Balanites aegyptiaca</i> *	<i>Tamarindus indica</i> *
<i>Bridelia micrantha</i>	<i>Terminalia brownii</i> *
<i>Cassia siamea</i>	<i>Terminalia prunioides</i>
<i>Casuarina equisetifolia</i>	<i>Terminalia spinosa</i>
<i>Combretum schumanii</i>	<i>Borassus aethiopum</i>
<i>Croton megalocarpus</i>	<i>Hyphaena coriacea</i>
<i>Dalbergia melanoxylon</i>	
<i>Erythrina abyssinica</i>	
<i>Eucalyptus camaldulensis</i> *	
<i>Eucalyptus citriodora</i> *	
<i>Eucalyptus microtheca</i> *	
<i>Faurea saligna</i>	
<i>Grevillea robusta</i>	

General description:

Dry, cool, highlands naturally dominated by grassy, open woodlands. Cattle ranching has proven the most viable economic activity.

Fruits which can be grown:

Guava
Mulberry
Pawpaw

**Trees known to grow in the zone:**

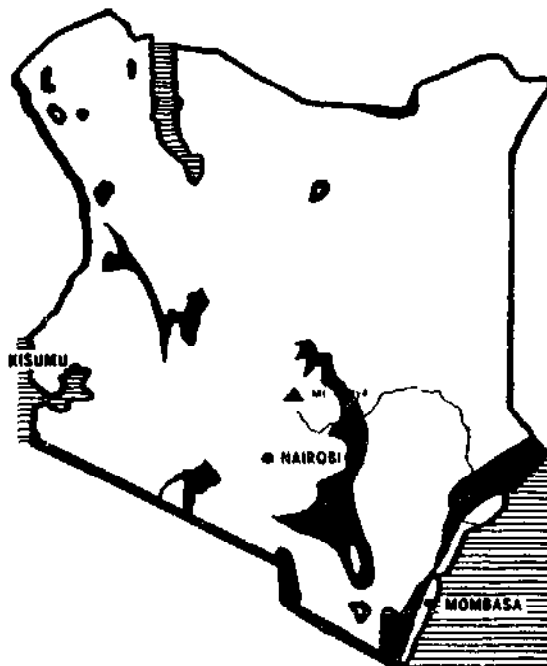
Aberia caffra
*Acacia gerrardii**
Acacia nilotica
Acacia seyal
Albizia coriaria
Balanites aegyptiaca
Bauhinia tomentosa
Bridelia micrantha
Casuarina equisetifolia
Croton megalocarpus
Eucalyptus camaldulensis
*Eucalyptus citriodora**
Grevillea robusta
*Juniperus procera**
Markhamia hildebrandtii
Markhamia platycalyx
Piliostigma thonningii
Prosopis chilensis
Prosopis juliflora
*Olea africana**
Podocarpus gracilior

General description:

Semi-arid land producing good crops only in exceptional rainfall years. A livestock area of open acacia and combretum woodland.

Fruits which can be grown:

Date Palm
Mango
Mulberry

**Trees known to grow in the zone:**

Acacia albida
*Acacia elatior**
*Acacia nilotica**
Acacia polyacantha
*Acacia senegal**
Acacia seyal
*Acacia tortilis**
*Adansonia digitata**
*Azadirachta indica**
*Balanites aegyptiaca**
Cassia siamea
Casuarina equisetifolia
Combretum schumanii
*Conocarpus lancifolia**
*Dalbergia melanoxylon**
Erythrina abyssinica
Eucalyptus camaldulensis
*Eucalyptus microtheca**
Hyphaena coriacea
*Melia volkensii**
Moringa stenopetala
Parkinsonia aculeata
Piliostigma thonningii
*Prosopis chilensis**

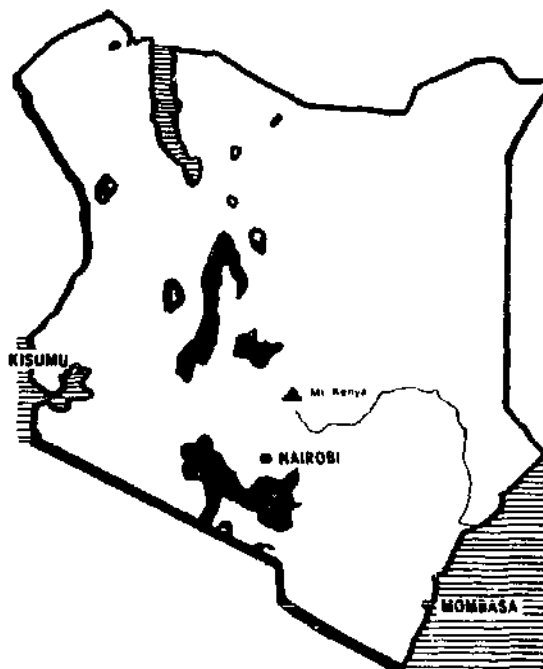
Prosopis juliflora
Salvadora persica
*Tamarindus indica**
Terminalia brownii
*Terminalia prunioides**
*Terminalia spinosa**
Zizyphus mauritiana

General description:

Semi-arid savannah grassland with low agriculture potential. Primarily a livestock grazing land with trees mainly in riverine settings.

Fruits which can be grown:

Mango
Mulberry

**Trees known to grow in the zone:**

Acacia albida
Acacia elatior
Acacia gerrardii
Acacia nilotica*
Acacia polyacantha*
Acacia senegal
Acacia seyal*
Acacia tortilis
Adansonia digitata
Balanites aegyptiaca*
Bridelia micrantha
Cassia siamea
Casuarina equisetifolia
Combretum schumanii
Erythrina abyssinica
Eucalyptus camaldulensis*
Eucalyptus microtheca
Melia volkensii
Moringa stenopetala
Parkinsonia aculeata
Prosopis chilensis
Prosopis juliflora
Salvadora persica
Tamarindus indica*

*Terminalia brownii**

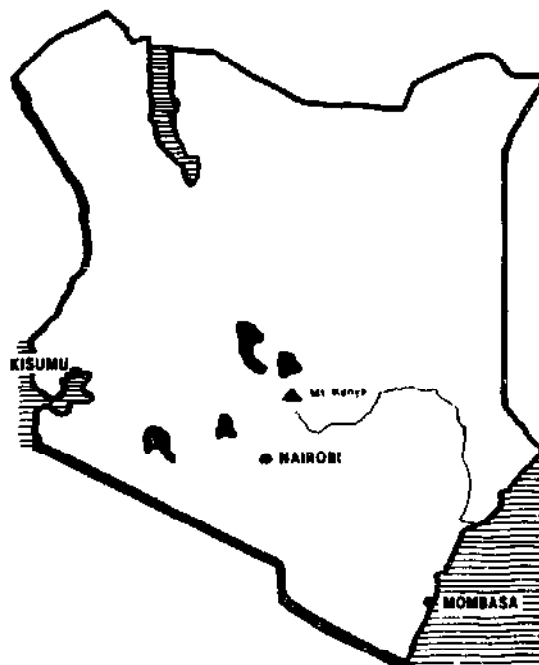
MARALAL/NAIVASHA TYPE (Zone V, 5)

General description:

Cool, semi-arid highlands usually with few trees. This type has very low agricultural potential and is primarily used for livestock.

Fruits which can be grown:

Fruit trees in this type are irrigated



Trees known to grow in the zone:

- Acacia gerrardii
- Acacia seyal
- (Acacia xanthophloea)
- Balanites aegyptiaca
- Bridelia micrantha
- Eucalyptus camaldulensis
- Prosopis chilensis
- Prosopis juliflora
- Grevillea robusta (?)
- (Schinus molle)
- (Tarchoranthus camphoratus)

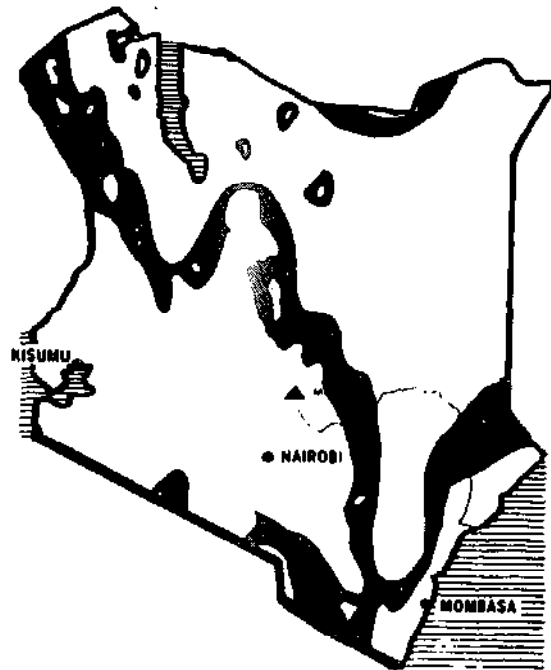
MAGADI/GARBA TULA TYPE (Zone VI, 1-2)

General description:

Hot, semi-arid to arid transition land between camel and cattle country. Acacia and commiphora are the major trees types.

Fruits which can be grown:

Date Palm
Mango

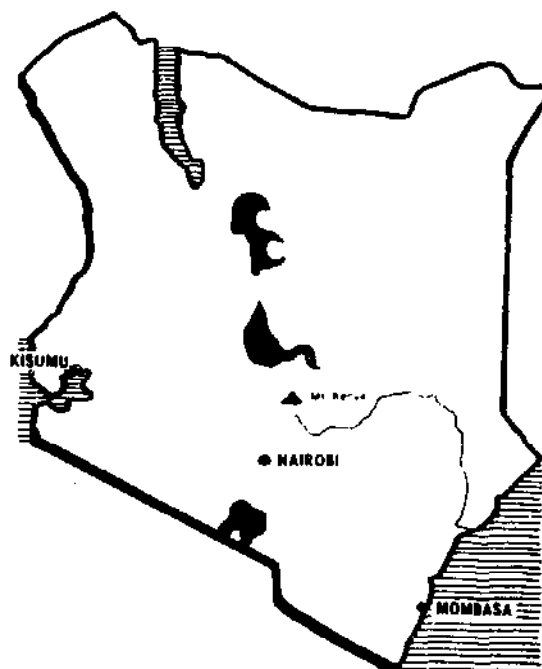


Trees known to grow in the zone:

*Acacia elatior**
Acacia nilotica
Acacia polyacantha
*Acacia senegal**
Acacia seyal
*Acacia tortilis**
Adansonia digitata
Azadirachta indica
Balanites aegyptiaca
Conocarpus lancifolia
Combretum schumanii
Dalbergia melanoxylon
*Hyphaena coriacea**
Melia volkensii
Moringa stenopetala
*Parkinsonia aculeata**
*Prosopis chilensis**
*Prosopis juliflora**
*Savadora persica**
Tamarindus indica
Terminalia brownii
*Terminalia prunioides**
*Terminalia spinosa**
*Zizyphus mauritiana**

General description:

Warm to cool, arid to semi-arid regions with very few towns. Primarily pastoralist country of cattle, sheep, goats and camels.

**Trees known to grow in the zone:**

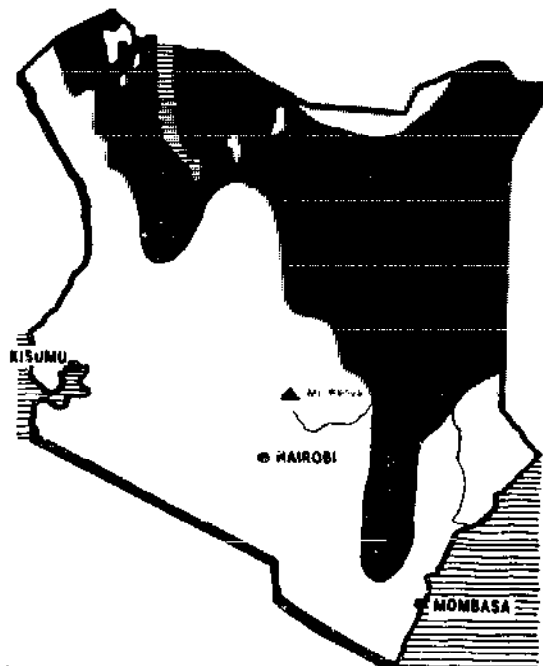
*Acacia elatior**
Acacia nilotica
Acacia polyacantha
Acacia senegal
Acacia seyal
*Acacia tortilis**
Balanites aegyptiaca
Melia volkensii
Moringa stenopetala
*Parkinsonia aculeata**
Prosopis chilensis
Prosopis juliflora
Salvadora persica
Tamarindus indica
Terminalia brownii

General description:

True camel country and the largest geographic climate type in Kenya. Acacia, commiphora and other very drought tolerant plants dominate those areas with some ground water.

Fruits which can be grown

Date Palm
Mango

**Trees known to grow in the zone:**

Acacia elatior
Acacia nilotica
*Acacia senegal**
Acacia seyal
*Acacia tortilis**
Balanites aegyptiaca
Conocarpus lancifolia
Hyphaena coriacea
Moringa stenopetala
*Parkinsonia aculeata**
*Prosopis chilensis**
*Prosopis juliflora**
*Salvadora persica**
Tamarindus indica
Terminalia spinosa
*Zizyphus mauritiana**

CHAPTER FOUR



Individual Trees Species Profiles

The 90 tree species listed in this directory are divided into two groups: indigenous and exotics; and fruit trees. All the trees, listed in each group, have seed available in Kenya. For indigenous and exotic trees there are five categories of information given about each species. Fruit trees are however, organised in a different style, which is explained at the beginning of the fruit section, because of their status and the greater amount of information available on them. The information on these trees come from a variety of sources which are listed in Chapter 5. Below is a brief explanation of the type of information found for indigenous and exotic trees.

Local Names (Indigenous only)

The local names given are far from a complete list. To provide such would involve a great deal of research. Some language groups have multiple names for each species, making it hard for the non-speaker to predict the most widely used name. Other times the same name is used for more than one species. In addition the spelling used here is not as accurate as it should be. Care should be exercised when using local names for scientific identification. One can be fairly certain however, that people knowing the local names of trees will have a good idea of their use and community value.

To obtain local names we used *Kenya Trees and Shrubs*, the local/botanical name file of the East African Herbarium in Nairobi and information collected in the field. Abbreviations used in the text are—with a few exceptions—from *Kenya Trees and Shrubs*. These are listed below.

Bon: *Boni* Bor: *Boran* Cher: *Cherangani* Dig: *Digo* Dor: *Ndorobo* Elg: *Elgeyo* Gir: *Giriama* Kamas: *Kamasia* Kam: *Kamba* Kik: *Kikuyu* Kip: *Kipsigis* Kis: *Kisii* Luh: *Luhya* Mar: *Marakwet* Mas: *Masai* Mer: *Meru* Nan: *Nandi* Pok: *Pokot* Sam: *Samburu* San: *Sanya* Seb: *Sebei* Som: *Somalia* Swa: *Swahili* Tav: *Taveta* Tai: *Taita* Turk: *Turkana*

Native Range (Exotics only)

The information given here provides readers with an idea of where the species came from originally and something of their present day distribution. It also gives other items of general information.

Uses

The section is basically self-explanatory, giving uses and problems relating to the individual tree. It is not exhaustive. Information on growth rates is relative.

Preferred Climate Type

The full range of each species is given in the Climate type/Tree Species List. The climax zone for each tree is indicated there with a*. The climate type or types are repeated here along with an indication of the most likely spots within that type or types, where the tree would be growing if this is known. Lastly, the highest and lowest extremes of the tree's range are given, where this is known.

Seed Information

In this section we include where available seed size; approximate seeding time; how long the seed can be expected to remain viable in storage; storage and handling problems; pre-treatment information; germination difficulties and the length of time a seedling needs in the nursery. Alternative methods of propagation are also given as appropriate. With many indigenous species, some of the above information is simply not known, or we have not come across it in our limited research. Any information which the reader may have on the above, should be sent to KENGO and it will be incorporated in any future editions.

Seed sources

We have two categories of seed sources. The first group consists of the personnel trained in forestry. These are the people who work full time with trees. There are a number of these sources working with the Ministry of Environment and Natural Resources in the Forest Department and the Ministry of Energy. The second group consists of people or groups working with trees, who have access to and are able to collect seeds of certain species. Generally, these people are not trained as they are farmers or people doing other jobs. This does not make them any less reliable than the first group.

We would greatly like to add to our list of seed suppliers in both groups. If you, as an individual or group, are interested in being a seed supplier please let us know. (See page 143).

ABERIA CAFFRA (Kei Apple)

Native Range

The kei apple is indigenous to Southern Africa.

Uses

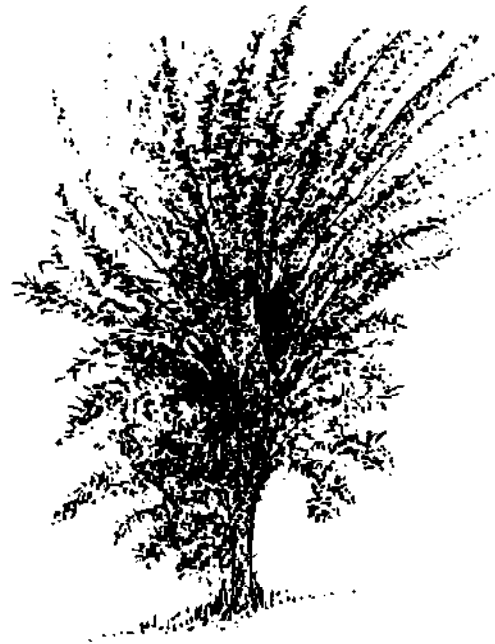
The kei apple is one of the most common fencing shrubs in use in the Kenya highlands. It can be allowed to grow up to five metres tall as a wide spreading bush, or kept neatly trimmed as a living fence. Its long, strong, slender thorns make the kei apple nearly goat-proof. It has a shallow, spreading root system which makes it moisture-competitive with maize, but other crops are not as affected. Kei apple fruits are edible but very sour-tasting, so they are best used for jam-making. The shrub prefers deep, well-drained soils, but also tolerates loamy clays.

Preferred Climate Type

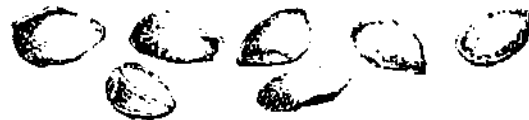
The kei apple can be found in abundance in the Nairobi, Limuru, Kericho and Kakamega climate types. In certain conditions, such as a high water table, it will also grow in the Rumuruti/Narok type. (Zone I, 3-6; II, 3-6)

Seed Information

When ripe, the yellow-orange fruit skins are cracked and allowed to rot for a week. The seeds, of which there are up to 20 per fruit, are then removed, and either sown immediately in beds, or dried and sent to those wanting seeds. Seeds germinate readily when fresh but lose viability within three months after picking. They are about 1.5 cm long,



0.5 cm wide, and slightly crescent-shaped with pointed ends. There are about 24,000 seeds per kilogram.



Seed Sources

The Seedsman, Forest Department Headquarters, P O Box 30513 Nairobi
Ministry of Energy Agroforestry Centre, Ngong, P O Box 30582 Nairobi
District Forest Officer, Laikipia, P O Box 8 Nyahururu
District Forest Officer, P O Box 546 Murang'a

Note

There are many species, both indigenous and exotic which can be used as hedges and living fences. Many of these are multi-purpose and grow over a wide area. A few are listed below.

ACACIA BREVISPICA, (Wait-a-bit Thorn)

Amaress (Bor), Furgorri (Som), Mugusi (Kam), Ol-girigiri (Mas), Mugucwe (Kik), Mwarare (Swa).

A widespread shrub which intertwines with surrounding vegetation. It provides a good

living fence and fodder. Common in Kajiado climate type. (Zone III, 1-4; IV, 1-4; V, 1-4; VI, 1-4).

CARRISA EDULIS

Mtanda-mboo (Swa), Kirumba (Tai), Makanea (Kam), Mukawa (Kik), Legetetuet (Nan), Limurie (Sam), Dagams (Bor).

Found from the coast to 2,000 metres, Kwale to Rumuruti/Narok climate types. A thorny forest edge bush which has a red edible berry. (Zone I, 3-6; II, 1-6; III, 1-6; IV, 1-6.)

EUPHORBIA TIRUCALLI

(Finger Euphorbia)

Anno (Bor), Mtupa Mwituu (Swa), Utudi (Dig), Ol-oile (Mas).

A widespread, drought-tolerant species, propagated by cuttings. It makes an excellent hedge and provides dry season fodder for goats and camels. Very fast growing in many climate types from Wajir to Rumuruti/Narok. (Zone III, 1-3; IV, 1-5; VI, 1-4; VII, 1-2).

CUPRESSUS LUCITANCA (Cypress)

A very popular hedge in the highland areas where it was introduced for this purpose by the Europeans. It is also used as a timber tree. Its major drawback is its competition with crops and for this reason other multiple-use fencing is recommended. It grows well in Nairobi, Eldoret and wetter climate types. (Zone I, 3-6; II, 3-6; III, 3-6).

OPUNTIA OPUNTIA (Paddle Cactus)

A thorny cactus with edible fruit which makes an almost impenetrable hedge if planted correctly. It is very easy to propagate by cuttings. You simply cut off one of the paddle-shaped sections and plant about half in the soil. It will root and grow quickly. Paddle cactus has grown out of control in many areas, especially on overgrazed sites, so care should be taken not to aggravate the situation. It does well even in dry highland sites like Rumuruti/Narok or Maralal/Naivasha climate types. A variety of thornless *Opuntia* makes a good dry season cattle fodder. (Zone IV, 3-6; V, 3-5; VI, 3-4).

ACACIA ABYSSINICA (Umbrella Thorn)

Local Names

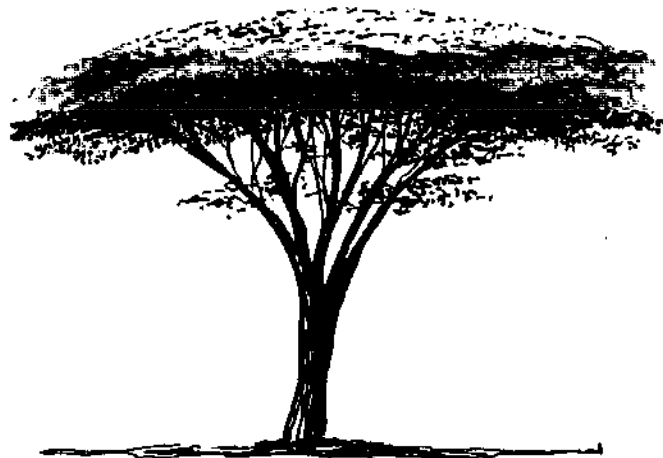
Mugugu (Kik), Seretuet (Nan), Esuvura (Luh), Marambajet (Seb), Evasurua (Kis).

Uses

A. abyssinica is one of the highland acacia often called umbrella thorn. It makes a fine shade and is ornamental. Often it is left in cattle-grazing areas. It could have a useful potential as fodder for goats, and it may also be nitrogen-fixing. Its growth rate is medium to fast depending upon conditions. Though this tree is known to be useful, written information on it is limited.

Preferred Climate Type

Grows in climate types such as Kericho and Limuru. It is the most common acacia near the Limuru and Banana Hill roads out of Nairobi. (Zone I, 4-7; II, 5-7; III, 5-7).



Seed Information

Seed from *A. abyssinica* is quite small and highly subject to beetle attack while still in the pod on the tree. Damaged seeds should be separated by floating. Undamaged seeds should be dried in the sun to kill the remaining larvae. Store in a cool, dry insect-free

place. Viability should be good over a long period, though no testing data is available at this time. Seed can be nicked or soaked 24 hours prior to sowing. Nursery performance is not known.



Seed Sources

The Silviculturist, Forest Department, P O

Box 74 Kikuyu
District Forest Officer, P O Box 28
Kapsabet
The Forester, RAES, P O Box 427 Kiambu
District Forest Officer, P O Box 28
Nyeri
The Forester, RAES Nyandarua, P O
Box 219 Ol Kalau
District Forest Officer, P.O. Box 775 Kisii

ACACIA ALBIDA (Apple Ring Acacia)

Local Names

Oi-erai (Mas), Seretuet (Nan), Larai (Sam), Eldurukoit (Turk), Dalyet (Seb), Mukababu (Tav), Apple Ring Acacia (Eng).

Uses

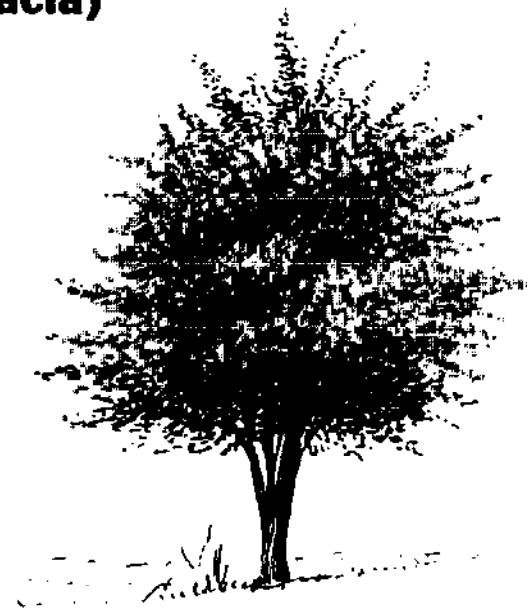
A. albida's most well-known use is its agroforestry intercropping with sorghum and millet in West Africa. The tree is nitrogen-fixing. It loses its nutrient-rich leaves at the beginning of the rainy season. A spacing of between 50 to 100 trees per hectare provides substantial fertilizer. It is deep-rooted and does not compete with crops for surface moisture. The 'apple-ring' shaped pods are an excellent fodder for goats, especially as they are dropped late in the dry season. The firewood it provides is less valuable than other acacia. For best growth and maximum production, *Acacia albida* requires a high water table and loamy, sandy clay soils which drain well. Without a high water table, closer than 7 metres to the surface, it is not worth planting this tree.

Preferred Climate Type

Acacia albida is a tree of drier areas, Taveta/Isiolo type, having a high water table. It is most commonly found in the Kerio Valley in riverine settings. (Zone IV, 1-3; V, 1-3; VI, 1-2; VII, 1-3).

Seed Information

The seed is large for acacia and there are around 10,000 per kilogram. They will store



almost indefinitely in dry, cool storage free of insects. Exact seeding time in Kenya is unknown, but it is thought to be in February or March. The seed can be nicked or soaked in water 24 hours. Germination is good and initial growth rate is quite fast.



Seed Sources

East Pokot Agricultural Project, Kositei
Catholic Mission, Nginyang via Nakuru
P O Marigat
EMI Forestry Project, c/o Provincial
Forest Office, P O Box 2 Embu
The Silviculturist, Forest Department,
P O Box 74 Kikuyu

District Forest Officer, Kieni West
P O Box 28 Nyeri
Mr Mark Lyles, c/o Rob Bloemers, Project
Manager, ARID, P O Box 1215 Kitale

Ministry of Energy Agroforestry Centre
Mtwapa P O Box 90290 Mombasa
Ministry of Energy Agroforestry Centre,
Ngong, P O Box 30582 Nairobi

ACACIA ELATIOR

Local Names

Muswiswa (Kam), Chemnialitiet (Nan), Bura (Som) Ewei (Turk), Burbuke (Bor), Munga (Dur).

Uses

A. elatior is a very large tree growing mainly along river beds in arid and semi-arid areas. It grows fast in this environment, providing shade, river bank stabilization and fodder, especially the young shoots and pods. It may also fix nitrogen. The major use of Muswiswa among the Kamba is as a boma fence. Its branches and long white thorns last longer than most other species for this purpose. Growth is much slower away from the riverine setting and plants must be protected and trained for upward growth in the initial stages.

Preferred Climate Type

Grows best in the Taveta/Isiolo climate type. Found growing widely in lower Machakos District and in the valleys of northern

Baringo District. (Zone IV, 1-3; V, 1-3; VI, 1-3 VII, 1-2).

Seed Information

The seed of *A. elatior* is thin and round, about 6 to 7 mm in diameter. It will store easily if kept cool, dry and insect free. Seeding time is not well known. Nicking or soaking the seed will speed germination. Normally, if this tree is planted, it is from wildings.



Seed Sources

District Forest Officer, P O Box 89 Garissa
EMI Forestry Project, c/o Provincial Forest
Officer, P O Box 2 Embu
The Forester, RAES Tana River, P O Box 18
Hola
East Pokot Agricultural Project, Kositei
Catholic Mission, Nginyang via Nakuru, P O
Marigat

ACACIA GERRARDII

Local Names

Sebeldit (Kamas), Ol-debbi or Elwai (Mas), Muthi, Kithi (Kam).

Uses

Along with *Acacia polyacantha*, *Acacia gerrardii* grows well in moist to swampy sites in riverine areas. It fixes nitrogen, may provide fodder and is tolerant to drought. With adequate ground water the tree is fast-growing. It has good agroforestry potential in its range and is said to give good fuelwood. Little is known about its overall performance.

Preferred Climate Type

Location preference is determined primarily by soil moisture conditions. Commonly found in riverine or swampy sites in the Rumuruti/-Narok and Kisumu/ Murang'a climate types. (Zone II, 3-5; III, 3-5; IV, 3-6; V, 3-6).



Seed Information

Seeds are about 1 cm long, 0.5 cm wide and

ly flat. They follow the same pattern for age and treatment as for other acacia. Data on nursery performance are not available, though seedlings have been grown successfully in the Ministry of Energy nurseries.

Seed Sources

District Forest Officer, Kieni West, P O Box 8 Nyeri
District Forest Officer, Kibilimine Station, P O Box 28 Nyeri
Ministry of Energy/ EDI, P O Box 30582 Nairobi
District Forest Officer P O Box 34 Narok
District Forest Officer P O Box Kajiado
District Forest Officer, P O Box 106 Kitui



ACACIA LAHAI (Red Thorn)

Local Names

debessi (Mas), Njebitet (Nan), Munye- (Luh), Omunyanya (Kis), Mateluk (Elg), zaule (Tai) Red Thorn (Eng).

Uses

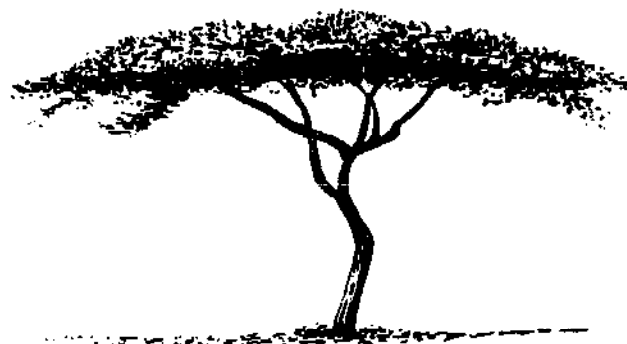
lahai is one of the two highland umbrella trees, especially notable along the road from Nakuru to Kericho. It is often left in fields, especially pastureland, for shade. As a potentially nitrogen-fixing it may improve soil fertility. Its use as a fodder is not known. The red thorn, as it is commonly known, produces hard heavy, rugged and durable timber, useful for heavy construction work and making posts and bridges. Indications are that it grows relatively fast, but this has not been confirmed. The shade is too broad and heavy for it to be intercropped with maize.

Preferred Climate Type

As indicated above, *Acacia lahai* is a cool, highland climate tree, being found mainly in the highland and Mountain climate types. (Zone I, 8; II, 5-7; III, 5-7).

Seed Information

Seeds are small and round measuring about 5mm in diameter and 2mm thick. Seeding



time appears to peak in July and August, but this is dependent upon location and tends to spread out over a long period. Many of the seeds get damaged in the pod and these should be separated by floating, then dried and stored as other acacia seeds. Germination techniques and other information are at present unavailable.



Seed Sources

District Forest Officer, P O Box 1 Londiani
District Forest Officer, P O Box 775 Kisii
District Forest Officer Nandi, P O Box 28 Kapsabet
The Forester, RAES, P O Box 427 Kiambu
The Forester, RAES Nyandarua, P O Box 2191, Ol Kalou
District Forest Officer Laikipia, P O Box 8 Nyahururu

ACACIA NILOTICA

Local Names

Musemei (Kam), Ol'Kiloniti (Mas), Sertwet (Nan), Mgungu (Swa), Ikilerili (Sam) Kopkwo (Pok), Burkekeh (Bor), Msemeri (Gir), Chebiwa (Kamas) Mgundi (Dur), Twer, Guider (Som).

Uses

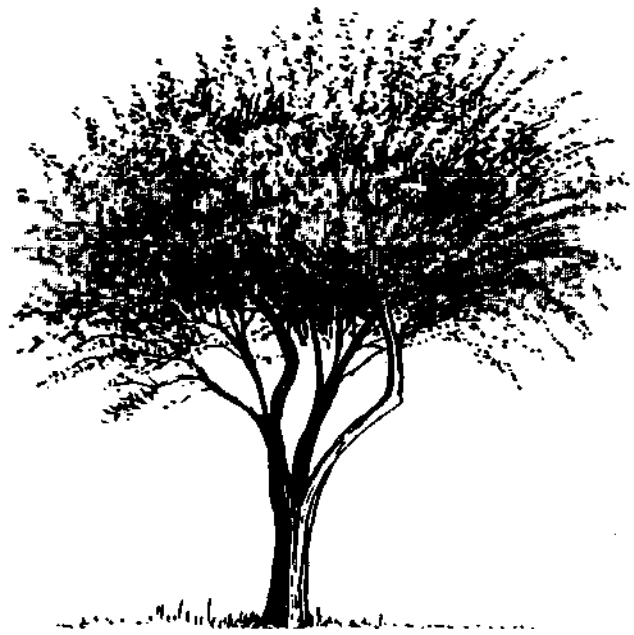
A. nilotica wood is tough, termite resistant and water repellent, with good fuel value. It makes good tools and can be used for carving. Leaves and pods are good fodder. Tannin for the leather industry can be obtained from the bark, which also gives medium quality gum. It grows well in sites which are seasonally flooded yet can also stand prolonged drought. It prefers alluvial river soil but can grow even on heavy, black cotton soil. Normally found as a small tree, it can grow to 15 metres tall on good sites and at a medium to fast rate. Sometimes wood-borers will attack weakened trees.

Preferred Climate Type

Acacia nilotica has a very wide climate preference, depending more on ground water than rainfall. It does well in riverine areas of the Wajir climate type, or more widespread in the Kisumu/ Murang'a climate types. (Zone III, 1-4; IV, 1-4; V, 1-4; VI, 1-4; VII, 1-2)

Seed Information

A. nilotica has a large seed, almost round, 6,000 per kilogram. It is often attacked in the pods by bruchid beetles and is sometimes difficult to clean. Sort and store as with other acacia. Direct sowing is possible but young plants do not compete well with



grasses or weeds. Fresh seed needs no pre-treatment but older seed should be soaked 24 hours or nicked. In the nursery it requires three to four months.



Seed Sources

District Forest Officer, P O Box 106 Kitui
EMI Forest Project, c/o Provincial Forest Officer, P O Box 2 Embu
Ministry of Energy Agroforestry Centre, c/o Better Living Institute, P O Box 683 Kitui
The Silviculturist, Forest Department, P O Box 74 Kikuyu
The Seedsman, Forest Department, P O Box 30241 Nairobi
Gideon Kinai, Kaewa Agroforestry Committee, c/o Mazingira Institute, P O Box 14550 Nairobi

ACACIA POLYACANTHA (Falcon's Claw Acacia)

Local Names

Musewa, Kivovoa, (Kam.) Mkengewa (Swa), Falcon's claw Acacia (Eng.).

Uses

A. polyacantha is another dry area riverine acacia which also extends into swampy and moist areas in western Kenya. With roots in the water table it grows at a fast rate, but

not survive without access to a water source. Its wood has a high concentration of tannins and is thus more resistant to termite and wood borer attack than most acacia. It makes good posts, tool handles and other implements. It may also fix nitrogen. This medium-to-large acacia produces a medium quality edible gum suitable for use as a food preservative.

Preferred Climate Type

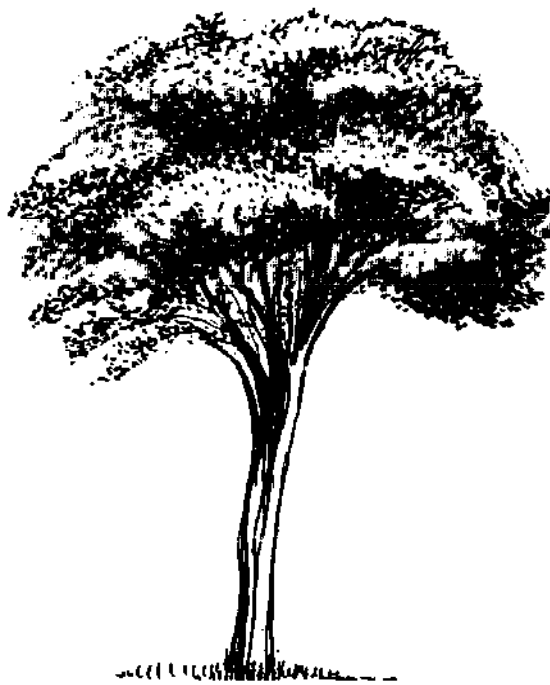
Common along stream beds in the Lake Victoria/Thika climate type. It can be found along the Tana River from Meru Game Park to Masina Dam. (Zone II, 1-3; III, 1-3; IV, 1-3; V, 1-3; VI, 1-3).

Additional Information

The falcon's claw acacia seeds abundantly, especially in season, which varies in different parts of Kenya. In Meru-Embu area the best seeding time is August and September.



The seed is flat and almost rectangular about 5 mm long by 6 mm wide. Storage is similar to other Acacia.



It is grown easily in the nursery.

Seed Sources

EMI Forestry Project, c/o Provincial Forest Officer, P O Box 2 Embu
 District Forest Officer, P O Box 376 Siaya
 Provincial Forest Officer Coast, P O Box 80078 Mombasa
 District Forest Officer, P O Box 106 Kitui

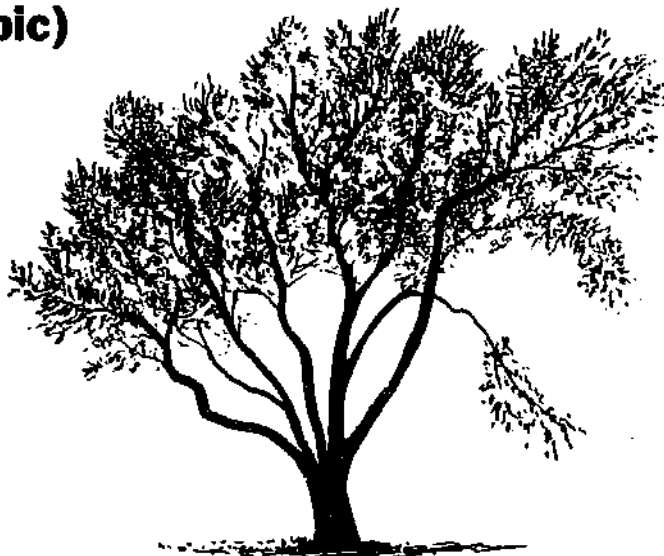
ACACIA SENEGAL (Gum Arabic)

Local Names

Kam (Kam), Olmunishui (Mas), Kikuyu (Kisumu), Adad, Edad (Som), Ekonoit (Kisumu), Chemangayau (Pok), Idado (Bor), Gum Arabic (Eng).

Uses

Acacia senegal is a true, multiple-use tree suitable for semi-arid or very dry areas. Its most important economic use is the production of gum arabic, a high quality gum used as a food preservative, glue, starch used for clothing and other industrial applications. Sudan is the major exporter but Kenyan trees also produce the gum. The wood makes top quality tool handles and posts.



Foliage and pods provide good fodder for goats and sheep. Seeds can be dried and eaten as a vegetable. In suitable areas it can

be grown with crops like millet and sorghum. As a sand stabilizer in dry areas there are few better species. *A. senegal* grows slowly in all but the the best conditions, it is in poor soil areas that gum production is best. Young trees require protection from grazing animals as they are highly palatable.

Preferred Climate Type

The gum arabic tree is a desert plant, growing well in the Magadi/Garba Tula and Wajir climate types. (Zone IV, 1-3; V, 1-3; VI, 1-3; VII, 1-2)



Seed Information

Acacia senegal seeds are round and flat, about 1 cm or more in diameter. There are

three in a pod often found hanging on the tree long after it has lost its leaves. It is not a prolific seeder, sometimes going for five years between peak production with little or no seed produced. Seeding time, when it finally occurs, is from July to September. Germination is not particularly good. Pre-soaked or nicked seeds give best results and they require about four months in the nursery. Storage and problems are similar to other acacia (See *A. albida*).

Seed Sources

EMI Forestry Project, c/o Provincial Forest Officer, P O Box 2 Embu
District Forest Officer, P O Box 89 Garissa
District Forest Officer, P O Box 48 Wajir
Garba Tula Secondary School Tree Club, P O Box 84 Isiolo
Gideon Kinai, Kaewa Agroforestry Committee, c/o Mazingira Institute, P O Box 14550 Nairobi
Isiolo Forest Station, P O Box 141 Isiolo

ACACIA SEYAL (Whistling Thorn)

Local Names

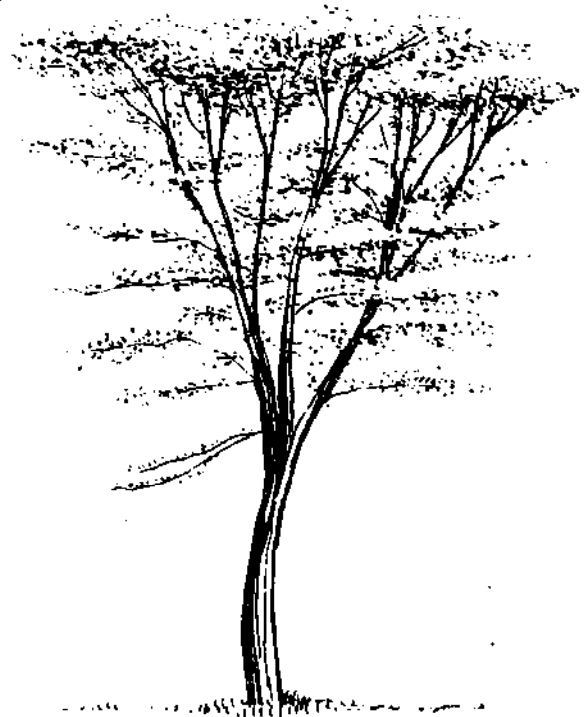
Mugaa (Kik), Musewa, Muua-Mweo (Kam.), Oriang (Luo), Olerai (Mas) Mugarit (Nan), Mgunga (Swa), Fullai (Som), Okulu (Luhya) Lebrai (Turk), Rena (Pok), Wajo, Wachodima (Bor).

Uses

This widespread, smooth green-barked acacia has many uses, not the least of which is its ability to thrive on deep, heavy, black-cotton soils. It produces a good quality gum, though inferior to *A. senegal*. Goats and sometimes camels, can be seen eating its foliage. Tannin from the bark is used by Somalis in Garissa to treat leather. The wood is hard and shock-resistant. Its nitrogen-fixing capacity is not known. *A. seyal* is a medium to fast grower and it does well in areas where few other species grow.

Preferred Climate Type

Acacia seyal prefers low sites and a high



water table rather than a particular climate type. It can be found on black cotton soils in Kisumu/Murang'a climate type or along rivers in the Wajir climate type. (Zone III, 1-4; IV, 1-5; V, 1-5; VI, 1-4; VIII, 1-2)

Seed Information

The seed is oval-shaped rather like an egg, about 8 mm in length. Seeding time is highly variable in its range, normally being ready about three months after the rains: July in north-east Kenya; August and February in western Kenya. Store it in a cool, dry place, away from possible insect attack. Nick or soak seed 24 hours before sowing. Its performance in a nursery is not known.

Seed Sources

EMI Forestry Project, c/o Provincial Forest

Officer, P O Box 2 Embu
District Forest Officer, P O Box 89 Garissa
Mr Michael Odula, Tom Mboya Secondary
School Wildlife Club, P O Box 13 Mbita
District Forest Officer Kitui, P O Box 106
Kitui
The Chief Miambani Location, c/o District
Forest Officer, P O Box 106 Kitui
District Forest Officer P O Box 376 Siaya
District Forest Officer Nyanza, P O Box
1048 Kisumu
NCKK Rhamu Service Centre, P O Box 19
Mandera

ACACIA TORTILIS

Local Names

Mulaa, Kilaa (Kam), Olgorete (Mas), Sesya (Nan), Ltepes (Sam), Esoi (Turk), Ses (Pok), Dadach (Bor), Kura, Quadi (Som).

Uses

Acacia tortilis is probably the most common tree used for charcoal making in dry areas of Kenya. It provides excellent fodder for camels, sheep and goats, especially the pods, which are often collected for sale around towns in north-east Kenya. It fixes nitrogen, can act as a living fence, provides shade and if well managed it grows relatively fast on dry sandy soils. It prefers alkaline soils and tolerates shallow, rocky types. It does not intercrop well because of its wide root system. Young plants require protection from goats.

Preferred Climate Type

Grows well in many climate types but is the most important tree of the Magadi/Garba Tula and Wajir climate types.
(Zone III, 1-3; IV, 1-3; V, 1-3; VI, 1-3; VII, 1-2)

Seed Information

Peak season for the small, 6 mm by 3 mm by 2 mm seeds is in August in Garissa, 1,000 seeds weigh approximately 75 grams. One could find seeds on trees in areas which had little rain in 1983 and which have no appreciable water table. The seed is easy to collect.



The seed remains viable for extraordinary lengths of time. A study in Turkana indicates that some seed remained in the soil 11 years before germinating. It is also a difficult one to pre-treat, being both hard to nick and responding poorly to soaking. Once germinated, it grows and transplants well from the nursery.



Seed Sources

District Forest Officer, P O Box 89 Garissa
EMI Forestry Project, c/o Provincial Forest
Officer, P O Box 2 Embu
East Pokot Agricultural Project, Kositei
Catholic Mission, Nginyang via Nakurr
P O Marigat
District Forest Officer, P O Box 2 Machakos

District Forest Officer, P O Box 106 Kitui
The Silviculturist, Forest Department, P O
Box 74 Kikuyu
Garba Tula Secondary School Tree Club,
P O Box 84 Isiolo

Gideon Kinai Kaewa Agroforestry
Committee, c/o Mazingira Institute, P O
Box 14550 Nairobi
NCCCK Rhamu Centre P O Box 19
Mandera

ACROCARPUS FRAXINIFOLIA

Native Range

Acrocarpus is a straight, very tall native of Southeast Asia. It can reach 60 metres in dense forest or 50 metres in open settings.

Uses

Originally acrocarpus was brought to Kenya as a shade tree for coffee and tea plantations. Its red flowers and bright red young leaves make it an attractive border or avenue tree.

The tree is nitrogen-fixing and the leaves provide good mulch, in plenteous amounts. Shade and root competition make it inappropriate for growing amidst annual crops like maize. Its timber is of medium quality, useful for lightweight furniture or light construction, but it is not durable in the ground. Acrocarpus growth rate borders on the spectacular, reaching over 3 metres in its first year.

Preferred Climate Type

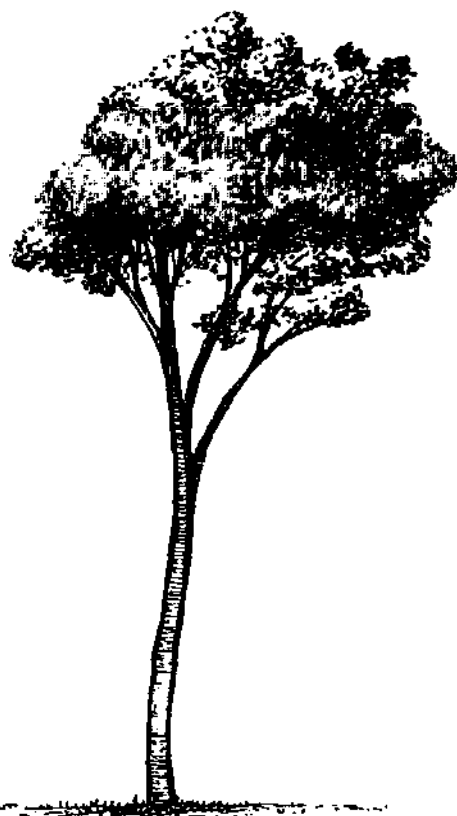
Primarily a tree of coffee and tea zones in Kenya. It grows well in both Kakamega and Nairobi climate types.
(Zone I, 3-5; II, 3-5; III, 3-5).

Seed Information

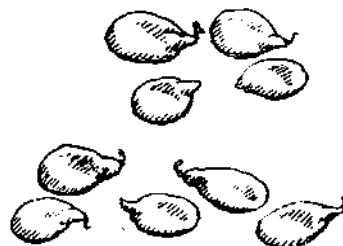
Seeds are small, around 12000 per kilogram, and very similar to some acacia types. Seeds are plentiful, peaking in July-Sept. They store well for a long period in cool, dry places. Collection from the ground is possible. Direct sowing of nicked or soaked seed works well. Acrocarpus requires 3 months or less in the nursery.

Seed Sources

EMI Forestry Project, c/o Provincial Forest Officer, P O Box 2 Embu



District Forest Officer, P O Box 775 Kisii
Ministry of Energy Agroforestry Centre,
Wambugu Farmers Training Centre, P O
Box 889 Nyeri



Nyeri Agroforestry Committee c/o Mazingira Institute, P O Box 14550 Nairobi
Mr Erasto Ajwang, P O Box 50, Oyugis
District Forest Officer, P O Box 28 Nyeri

ADANSONIA DIGITATA (Baobab)

Local Names

Murambu (Meru), Mwamba (Kam), Olimisera (Mas), Mbuyu (Swa), Muru (Baj), Baobab (Eng).

Uses

Baobab has many uses, but unlike most other trees in this directory, fuelwood is not one of them. The large swollen trunk is often hollowed out and used for water storage. The pulp, surrounding the seeds inside the hard fruit coat, is loaded with vitamin C and tastes refreshing. Fresh leaves make a delicious vegetable. The wood makes good pulp for strong coarse paper and is used for canoes, floats, trays and platters. Bark fibre makes ropes, baskets, snares, fibre cloth, musical instrument strings and even water proof hats. Stripping the bark does not kill the tree. Young baobab trees are hard to find as elephants find the whole plant palatable of until they are three years old.

Preferred Climate Type

Baobab is primarily a tree of lower, semi-arid areas, being most frequently encountered in the Taveta/Isiolo climate type. (Zone III, 1-2; IV, 1-3; V 1-3; VI, 1-2.)

Seed Information

Over 100 seeds of about 1 cu cm are found in one fruit. These have a thick hard coat and are seldom visibly damaged. Floating the seed will remove about a third of the total, increasing potential germination percentage in the rest. Seeds store well in cool, dry conditions and are not greatly threatened by insects. Germination is poor. The only effective pre-treatment found so far is cracking to seed coat, but this can



damage the seed. Once started, it grows well and can be 2 metres tall in two years.



Seed Sources

EMI Forestry Project, c/o Provincial Forest Officer, P O Box 2 Embu
East Pokot Agricultural Project, Kositei Catholic Mission, Nginyang via Nakuru
P O Box Marigat
The Chief, Miambani Location c/o District Forest Officer Kitui, P O Box 106 Kitui
The Forester, Gede, P O Box 201 Malindi

AFZELIA CUANZENSIS

Local Names

Mukambakusi (Swa), Mwamba (Gir).

Uses

The most important use of this tree is timber.

It is high-quality wood, hard, heavy durable and termite-resistant. Afzelia has a short bole with a broad crown and large leaves. It makes a good shade tree. Though in the legume family, it does not fix nitrogen and

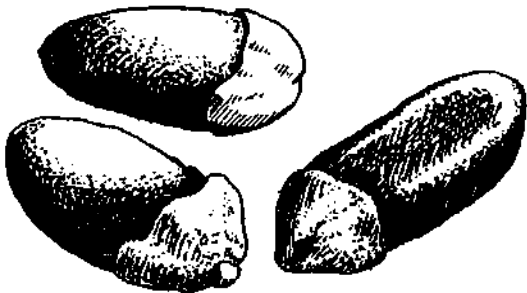
its ability to associate with crops remains unclear. *Azelia* grows quite slowly, as is true of most high quality hardwoods.

Preferred Climate Type

Strictly a coastal tree, especially in Kwale and Lamu climate types (Zone II, 1; III, 1; IV, 1)

Seed Information

Azelia has an unmistakable seed, large and black with one end bright orange. Seed from dry unopened pods on the tree are normally undamaged, but once the hard, woody pod



opens insects will cause problems. Store in a cool, dry place away from possible insect



attack. Direct sowing in pots without pre-treatment is possible. They need between 4 and 6 months in the nursery before transplanting.

Seed Sources

District Forest Officer, P O Box 5 Kwale
Ministry of Energy, EDI Seeds, P O Box
30582 Nairobi.

The Forester, Gede, P O Box 201 Malindi
District Forest Officer, P O Box 80078
Mombasa

ALBIZIA CORIARIA (Ober)

Local Names

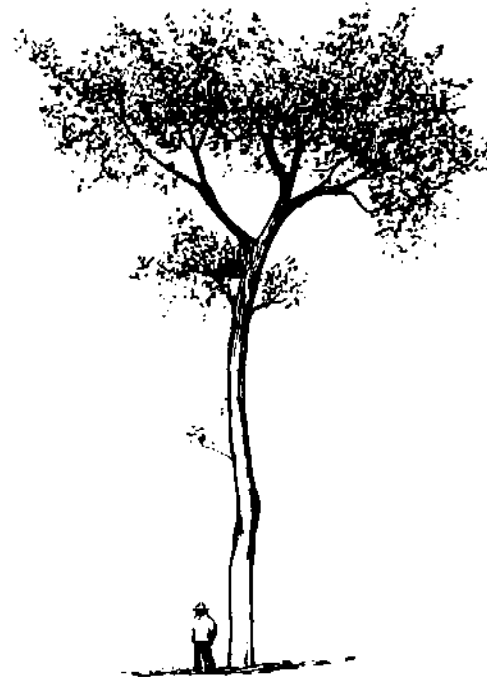
Mukurwe (Kik), Ober (Luo).

Uses

Normally seen these days as a medium-sized, rather twisted tree set off by itself. In forest or more dense stands *A. coriaria* grows quite straight. Even in twisted form it produces a good quality timber, which is very durable. Potentially it is a nitrogen fixer and is deciduous. The ability to associate with crops is indicated by the tendency to leave the tree standing in cultivated fields. (*Albizia amara*, Ruga (Luo) produces very durable poles and grows in the same area as *A. coriaria*, but not as large.)

Preferred Climate Type

Most of these trees grow in the Lake Victoria Basin area, preferring the Migori and Kisumu/



Murang'a climate type.
(Zone I, 3-4; II, 3-4; III, 3-5; IV, 3-4).

Seed Information

The seed is round and somewhat thick, probably less than 6,000 per kilogram, Exact seeding time is difficult to determine it is



thought to be during the November-January period. It is susceptible to beetle attack and has a viability of at least a year. Tests are

needed to determine just how long it can be stored. Sow either untreated or soaked seed. Fresh seed probably needs no pre-treatment. Nursery experience with this tree is limited.

Seed Sources

District Forest Officer, P O Box 66 Homa Bay

District Forest Officer, P O Box 376 Siaya

District Forest Officer, P O Box 1048

Kisumu

District Forest Officer, P O Box 775 Kisii

Mr Abner Mango Opot, P O Box 194 Yala

Mr Erasto Ajwang, P O Box 50, Oyugis

ALBIZIA GUMMIFERA

Local Names

Mukurwe (Kik), Mwethia (Kam), Set, Seyet (Nan), Makonzuli (Luh), Sogore (Sam), Ekewait (Turk), Omugonjoro (Kis), Msarawachi (Tai).

Uses

A. gummifera is the most widespread of the albizia in this directory. It also has more ceremonial uses, especially as a meeting tree for traditional leadership assemblies. It makes an excellent shade tree, growing quite tall and spreading. It may also fix nitrogen and is known to be a good mulch tree in Embu district. The timber is inferior to *A. coriaria*, highly susceptible to wood borer attack, yet good for indoor uses.

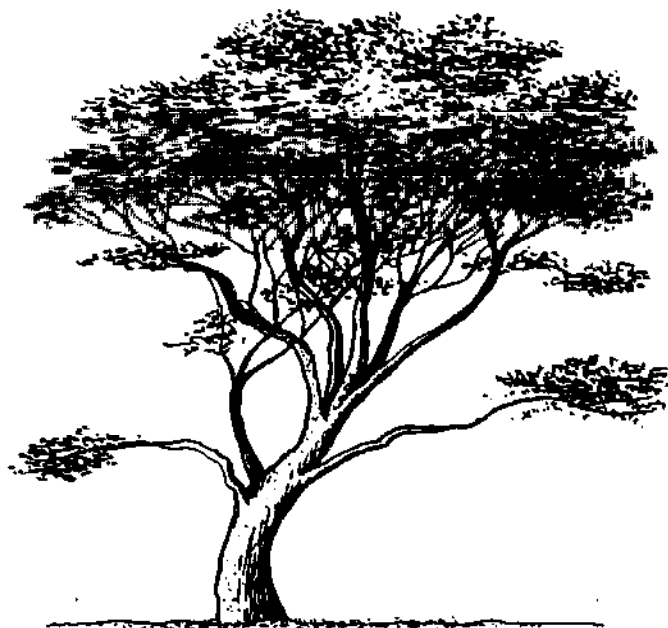
Preferred Climate Type

Though quite widespread, the tree grows poorly in higher areas. Peak growing areas include Nairobi and lower Limuru climate types. (Zone I, 3-6; II, 3-6; III, 3-6; IV, 3-6).



Seed Information

Both the tree and the seed can easily be confused with *Albizia coriaria*. *A. gummifera* seed is slightly smaller. The seeding time



is spread but January and February seem to be the peak period. In viability, storage and germination it is similar to *A. coriaria*.

Seed Sources

EMI Forestry Project, c/o Provincial Forest Officer, P O Box 2 Embu

District Forest Officer, P O Box 28 Kapsabet

District Forest Officer, P O Box 775 Kisii

District Forest Officer, P O Box 1043 Wundanyi

District Forest Officer, P O Box 460 Kakamega

The Silviculturist, Forest Department, P O Box 74 Kikuyu

ALBIZIA ZYGIA

Local Names

Oturbam (Luo), Mukunzuru (Nan).

Uses

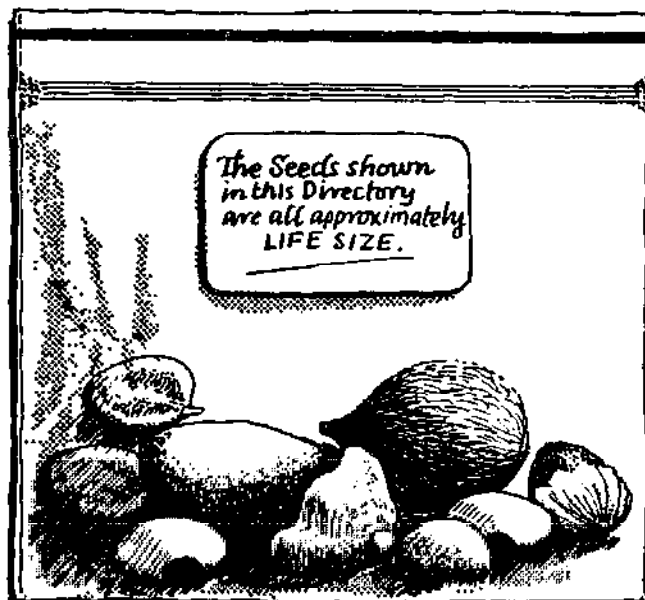
Like Ober, Oturbam was primarily a forest tree now found isolated on shambas or grazing areas. It has good quality timber, fairly easy to work, durable, but not termite proof. It, too, probably fixes nitrogen and provides mulch. As an agroforestry tree it is still untested, but it does have some potential.

Preferred Climate Type

It has a narrow range, preferring the Migori and Kakamega climate types. It is most common in the Kisii-Oyugis area. (Zone I, 3-5; II, 3-5; III, 3-5)

Seed Information

The seed is smaller and flatter than either of the other Albizia, but has the characteristic round shape, with slightly swollen centre. (See *Albizia coriaria* for other information).



A handy self-sealing plastic seed packet.

Seed Sources

Wire Forest Department, P O Box 60 Oyugis
Mr Erasto Ajwang, P O Box 50 Oyugis
Mr Abner Mango Opot P O Box 194, Yala
District Forest Officer, Nandi, P O Box 28
Kapsabet

ANTIARIS TOXICARIA (False Mvule)

Local Names

Mulundu (Luh), Mkunde (Swa), Olwaa (Luo), False Iroko, False Mvule (Eng), Mnguenguo (Dig.) Maringa (Nan),

Uses

Antiaris looks similar to *Chlorophora excelsa* (Mvule) and in Luo it even has the same name (Olwaa). It can be separated from mvule by its shorter height, denser crown and copious creamy latex visible when the bark is damaged. From that bark a strong, coarse bark cloth is obtained. Fruits are edible. Except for the shade from its dense, but not widespread crown, it mixes well with crops. The tree grows moderately fast, timber being available in 30 years. The wood is light and easily attacked by insects, so should be processed quickly upon cutting. Normal use is for indoor veneers. The wood provides only mar-

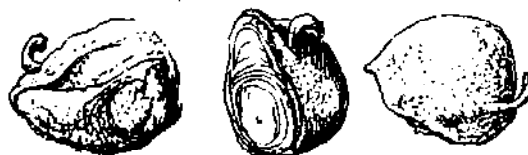
ginal fuel.

Preferred Climate Type

Antiaris grows best in Kakamega and Ramisi climate types. (Zone I, 3-7; II, 4-7).

Seed Information

The fruit is 1-2 cm long with edible pulp. The seed has only a short viability, about three months, but this is uncertain, so fresh seed is



important. March is probably the peak seed-ing time. Little is known about storage, germination or nursery requirements.

Seed Sources

District Forest Officer, P O Box 376 Siaya
District Forest Officer, P O Box 460

Kakamega

District Forest Officer, P O Box 28 Kapsabet
District Forest Officer, P O Box 775 Kisii

AZADIRACHTA INDICA (Neem)

Native Range

Neem, which is now one of the most widespread exotics in Africa, originally came from India, Burma and Thailand, where it is very highly valued, often regarded as a sacred tree. Sometimes it is also called Margosa.

Uses

A true multiple use tree. There is even a Neem Society devoted to the collection, distribution and research on neem. After its first year neem grows quickly, giving high yields of fuelwood. Timber is durable, tough, termite resistant, with a mahogany like grain, though white. Neem makes excellent poles and heavy construction wood. Oil from the seeds can be used as a substitute for paraffin in hurricane lamps. Oil seed cake left over from oil extraction, contains nitrogen, calcium and potassium, making a good fertilizer. Leaves and twigs provide a good mulch which may be nematode repellent. Leaves, eaten by goats, contain a natural de-wormer. In Asia, a tea made from its leaves is used to relieve malaria. This same tea can be sprayed on animals to repel ticks and other insects. Leaves, twigs and seeds contain an insect repellent but the fruit does attract flies. It grows well on poor soils, making it useful in soil conservation and erosion control. Goats and camels will eat the leaves if other fodder is scarce.

Preferred Climate Type

Neem has been overrated for very dry areas. Its best climate type is Taveta/Isiolo.

(Warning: Neem can be weedy especially if there is ground water near the surface)
(Zone III, 1-3; IV, 1-3; V, 1-3; VI, 1-3).

Seed Information

Fresh seeds are rapid germinators, very easy to grow in the nursery. Viability is very short



lasting a maximum of two months. Seeds are light, 11 000 per kilogram, about 1 cm long. The fruit pulp must be removed and the seed dried before transportation. At the coast, neem seeds in April-May and Rhamu seeds come in two seasons, January-February, July-August.



Seed Sources

Ministry of Energy Agroforestry Centre,
Mtwapa, P O Box 90290 Mombasa
Baobab Farms Ltd, P O Box 90202 Mombasa
East Pokot Agricultural Project, Kositei
Catholic Mission, Nginyang via Nakuru
P O Box Marigat
District Forest Officer, P O Box 89 Garissa
Garba Tula Secondary School Tree Club,
P O Box 84 Isiolo
NCKK Rhamu Service Centre P O Box 19
Mandera

BALANITES AEGYPTIACA (Desert Date)

Local Names

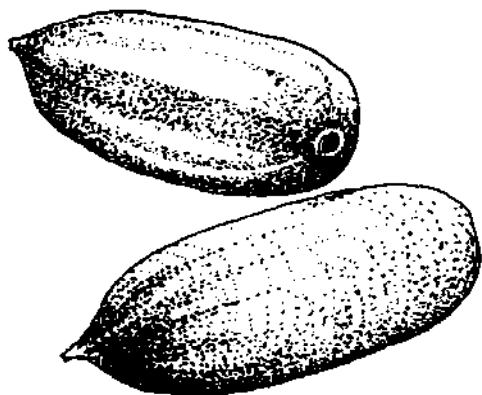
Mulului (Kam), Otho (Luo), Olongosua (Mas), Mjunju (Swa), Arraronyit (Turk), Tuyununo (Pok), Baddan (Bor), Desert Date (Eng).

Uses and Limitation

As the name desert date implies, the fruit of *B. aegyptiaca* is edible. It produces fruit even in very dry years; the reason for its high value. An emulsion of the fruit put in slow moving streams, irrigation canals or lakes, kills the snail which carries the bilharzia parasite and the cyclops flea which transmits Guinea worm. In high concentration it can kill fish. Goats and camels eat the leaves and fruit. Some people even use it for zero grazing systems. The wood is of moderate weight, with a smooth open grain, carving and turning well, of good colour and termite-resistant. It grows well in low-lying areas which are sometimes flooded and tolerates heavy clay soils. *B. aegyptiaca* grows slowly and requires protection when still a seedling. It is highly valued in those areas where it occurs naturally.

Preferred Climate Type

Very widespread, doing well in many climate types. Dominant areas include the Taveta/Isiolo and Kajiado climate types. (Zone III, 1-5; IV, 1-5; V, 1-5; VI, 1-4; VII, 1-2)



Seed Information

The seed is relatively large up to 4 cm long and 2 cm in diameter. It stores well for up to



one year, if the outer fruit is removed and kept clean and dry, away from insect attack. Seeding time varies according to location, in Garba Tula it is ready in October. Soak the seed overnight to improve germination. Sow the seed vertically, with the stem end down for best results. Germination occurs in 1-4 weeks and the tree requires about 12 weeks in the nursery. Direct sowing is an option.

Seed Sources

East Pokot Agricultural Project, Kositei
Catholic Mission, Nginyang via Nakuru
P O Box Marigat

Ministry of Energy Agroforestry Centre c/o
Better Living Institute, P O Box 683 Kitui.
EMI Forestry Project, c/o Provincial Forest
Officer, P O Box 2 Embu

Ministry of Energy Agroforestry Centre
Ngong, P O Box 30582 Nairobi

Gideon Kinai, Kaewa Agroforestry Committee
c/o Mazingira Institute, P O Box 14550
Nairobi

Mr Michael Odula, Tom Mboya Secondary
School Wildlife Club, P O Box 135 Mbita
Garba Tula Secondary School Tree Club,
P O Box 84 Isiolo

The Chief, Miambani Location c/o District
Forest Officer, P O Box 106 Kitui

BORASSUS AETHIOPUM (African Fan Palm)

Local Names

Mvumo, Mtappa (Swa), Mugumo (Dur), Ong (Bon), Mtame (San) Borassus Palm, African Fan Palm (Eng).

Uses

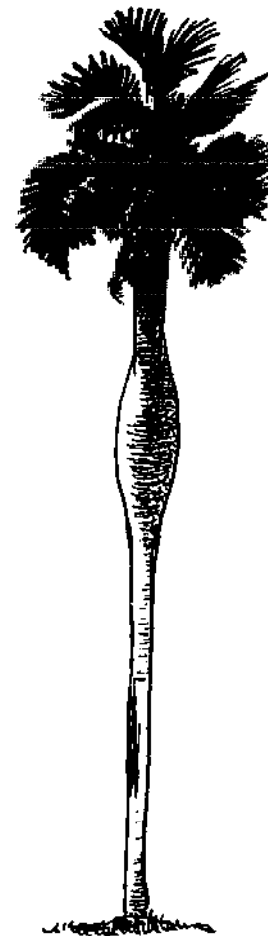
The palm family is one of the most useful of all tree families. They produce food, oils, timber, dyes, fibre, raw material for mats and baskets and even wine. Kenya has seven palm types, two of which are given in this directory. All are useful. The borassus palm is the largest, rarest and perhaps the most useful of Kenya palms. It is rare, possibly because people over-tapped the tree for its refreshing sap, which makes excellent wine. The fibrous borassus palm wood is highly termite resistant and strong, used mainly for housing supports. Leaves make excellent baskets and mats. The large orange fruit has edible pulp and seeds. Even very young seedlings are edible. Borassus palms grow slowly, but thrive on seasonally swampy sites unsuitable for most species.

Preferred Climate Type

Range restricted to coastal areas in Kenya, Ramisi, Kwale and Lamu climate types, being most common in the Shimba Hills. In Uganda the tree grows widely in areas of the Kakamega and Migori climate types. (Zone I,3; II, 1-3; III, 1-3; IV, 1).

Seed Information

Fruits are very large, weighing over 1 kilogram each and containing 3 seeds. The seeds are large as well, weighing about 100 grams. These should be directly sown at the location desired as the plant produces a very long



taproot even before the first leaf emerges. (Roots can be 1 metre deep when the leaf is only 1 cm high). The oily seed has a short viability and should be sown soon after removal from the pulp.

Seed Sources

The Forester, Kwale Forest Station, P O Box 16005 Kwale
The Forester, (RAES Kilifi), P O Box 29 Kilifi
District Forest Officer, P O Box 80078 Mombasa

BRACHYLAENA HUTCHINSII (Muhugu)

Local Names

Muhugu (Kik), Mubunbu (Kam), Diamagdad (Nan), Muhuhu (Swa), Mvuno (Dig).

Uses

Muhugu is both the Kikuyu name and trade name for this highly valuable timber. Among

the Kamba it is the primary carving wood, second only to *Dalbergia melanoxylon* in value. The fine, wavy grained wood finishes very well and is extremely durable, almost impenetrable to wood borers and termites. Even today it is a relatively common forest species around Karen. Many people feel it can associate with crops, though this has not been tested. Its narrow crown and abundant growth under the tree indicates some agro-forestry potential. Muhugu grows at a slow to medium rate, depending on conditions.

Preferred Climate Type

Muhugu's preference for both Lamu and Nairobi climate indicates that there are two distinct provenances. It is a dominant species of coastal forests as well as Karen. (Zone II, 1-5; III, 1-5; IV, 1-5).

Seed Information

Like most members of the compositae family, seeds from brachylaena are quite small and difficult to collect. Undoubtedly the eas-



iest method is to collect windings. At Karura seeds are available in February and March. These are collected by sweeping beneath the



tree and sowing directly in seed beds. Germination is poor.

Seed Sources

Ministry of Energy EDI Seeds, P O Box 30582 Nairobi
 The Forester-in charge, Ngong Forest Station, P O Box 30513 Nairobi
 The Forester-in-charge, RAES Nyeri, P O Box 28 Nyeri
 The Silviculturist, Forest Department, P O Box 74 Kikuyu

BRIDELIA MICRANTHA

Local Names

Mukogo, Mureru (Kik), Mukwengwe (Mer), Athiumo, Adhumo (Luo), Ngorouet (Nan), Mukengunya (Luh).

Uses

Bridelia is regarded as one of the best fire-wood and charcoal trees in areas where it grows naturally. This, plus the durability and termite resistance of the wood, greatly added to its exploitation and present scarcity. Poles from bridelia are used in hut con-

struction and timber is good for interior carpentry. The crown is dense and broad, therefore not recommended for intercropping

Preferred Climate Type

A very widespread tree doing well in a number of climate types, the best perhaps is Migori. It grows along the coast and Masai Mara Game Park (Zone I, 3-6; II, 1-6; III, 1-5; IV, 1-4).

Seed Information

The seed is found in capsule-like fruit along the branches. It is small, with a high oil content so its viability is probably rather short. Little is known about its propagation. There is potential that it will reproduce from cuttings as do other members of the Euphorbia family. Seeds are available at the beginning of the March-April rains in Western Kenya.



Seed Sources

Ministry of Energy Agroforestry Centre,
Bukura Institute, P O Box 23 Kakamega
District Forest Officer, P O Box 376 Siaya
District Forest Officer, P O Box 160005
Kwale
District Forest Officer, P O Box 755 Kisii
District Forest Officer, P O Box 110 Meru

District Forest Officer, P O Box 80078
Mombasa
District Forest Officer, P O Box 34 Narok
District Forest Officer, P O Box 28
Kapsabet
Mr Erasto Ajwang, P O Box 50 Oyugis

CALODENDRUM CAPENSE (Cape Chestnut)

Local Names

Mukobo, Muraraci (Kik), Yangu (Kam), Elarashi (Mas), Kipkarkuriat (Nan), Larachi (Sam), Ocarashit (Pok) Murei (Tav), Cape chestnut (Eng).

Uses

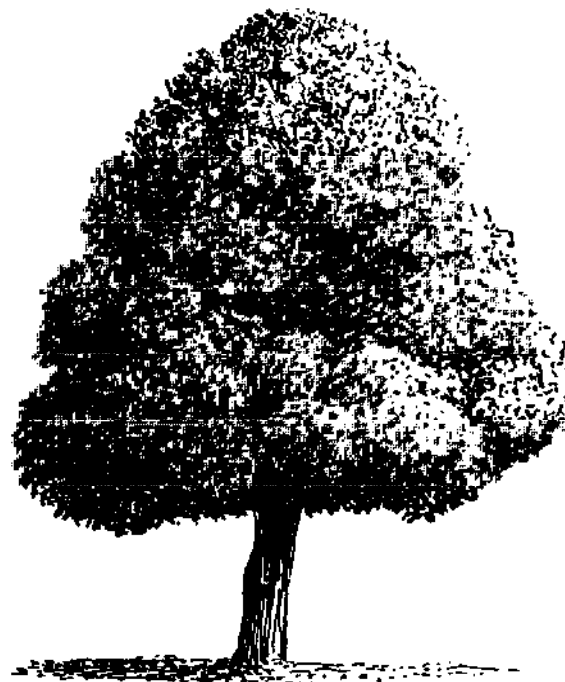
The cape chestnut is primarily cultivated for its beauty. The leaves can be used for mulch but probably give too dense a shade for growing in cultivated areas. As a firewood it is quite good and the timber is of some utility.

Preferred Climate Type

Cape chestnuts are common on slopes of the Eastern Rift Valley. They do best in Nairobi and Eldoret climate types. (Zone I, 3-6; II, 3-6; III 3-6).

Seed Information

The seed is large about 1.5cm on a side, and black-stripped with white edge. Often the seed



is hollow so requires floating to separate bad seeds. The seed remains viable about one year but fresh seed is definitely best. Direct sowing in seed beds works well but

germination seems to be spread out in any case. *Calodendrum* grows slowly in most conditions.

Seed Sources

Ministry of Energy/EDI Seeds, P O Box 30582 Nairobi

District Forest Officer, P O Box 28 Nyeri
Kibiko Primary School Agroforestry Pro-



ject c/o Mazingira Institute, P O Box 14550 Nairobi

District Forest Officer, Laikipia P O Box 8 Nyahururu

CASSIA SIAMEA

Native Range

This cassia is one of two exotics commonly found in Kenya, the other being *Cassia spectabilis*. It is indigenous to S.E. Asia, India and Sri Lanka and is now widespread in the tropics.

Uses

C. siamea wood is hard and heavy with an attractive heartwood. As fuelwood, it is good but smoky. It coppices well and grows quickly. It provides a dense shade, makes a good ornamental tree and wind-break, and has some compatibility with crops. Does well on overgrazed sites and bare hills. The fodder is poisonous to pigs but not cattle or sheep, yet its generally avoided by animals.

Preferred Climate Type

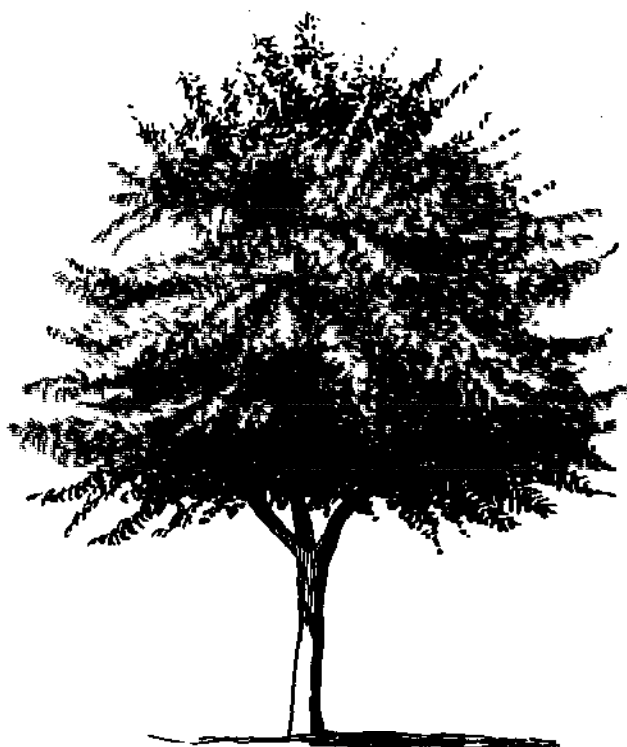
C. siamea is not as drought-tolerant as is presumed. It grows well in the Lake Victoria/ Thika climate type, but requires irrigation in Magadi/ Garba Tula and Wajir types. (Zone II, 1-3; III, 1-3; IV, 1-3; V, 1-3).

Seed Information

Seeds are shaped like small, warped discs, quite thin and about 8 mm in diameter. They



are best sown fresh, requiring no pre-treatment. Older seeds should be nicked or



soaked. Seeds store for up to one year, but germination percentage steadily decreases during the course of the year. Seedlings require about 4 months in the nursery.

Seed Sources

Ministry of Energy Agroforestry Centre
Mtwapa, P O Box 90290 Mombasa

Ministry of Energy Agroforestry Centre,
Kitui, c/o Better Living Institute, P O Box 683 Kitui

District Forest Officer, P O Box 66 Homa Bay

Tom Mboya Secondary School Wildlife Club, P O Box 135 Mbita

CASUARINA EQUISETIFOLIA (Mvinje, Whistling Pine)

Local Names

Mvinje (Swa), Whistling Pine (Eng).

Uses

C. equisetifolia is a multiple use, nitrogen fixing tree, indigenous to the Kenya Coast. (There is some debate about its indigenous status as it could very well have been brought from India centuries ago). Mvinje is used as timber, poles, mulch, sand stabilizer and soil reclaimer at the Coast. It is salt and flood tolerant, often being the tree closest to the high tide line. A row of *C. equisetifolia* makes an excellent windbreak. It grows fast, producing firewood called by some, 'the best in the world'. Good pulp can also be obtained from the wood. Seedlings and the wood are susceptible to termite attack, though it is durable otherwise. It does not coppice.

Preferred Climate Type

Although primarily a coastal species (Kwale, Lamu and Taveta/Isiolo types) growing near the shore line, *Casuarina equisetifolia* has done surprisingly well at higher elevations including Nairobi and Rumuruti/Narok climate types (Zone II, 1-4; III, 1-4; IV, 1-4; V, 1-4).

Seed Information

Seeds are small and winged, about 100,000 per kilogram. They remain viable for at least one year in storage. Seed should be sown in a seed bed and pricked out into pots. They should be ready for transplanting in 4 months.



Seed Sources

Baobab Farms Limited, P O Box 90202
Mombasa
Ministry of Energy Agroforestry Centre,
Mtwapa Farmers Training Centre, P O
Box 90290 Mombasa
Ministry of Energy/EDI Seeds,
P O Box 30582 Nairobi

CASUARINA CUNNINGHAMIANA (Australian Beefwood)

Native Range

This highland casuarina resembles the indigenous *C. equisetifolia* but is an exotic from the hills of Eastern Australia. There it is sometimes called Australian Beefwood because cattle eat the leaves (actually modified branches) when grass is in short supply.

Uses

The long, green branchlets of *C. cunninghamiana* whistle in the wind, slowing it down quite markedly. They are excellent windbreaks. The timber is useful but not notable. Fuelwood and charcoal are excellent. The tree grows at a moderate rate. It does not

coppice. Some information indicates that it fixes nitrogen but this has not been examined in Kenya. Even so the mulch provided is excellent.

Preferred Climate Type

A highland tree which prefers a moist climate like the Limuru type. However, it will do well in drier places like Rumuruti/Narok. (Zone I, 3-7; II, 4-7; III, 4-7; IV, 4-6).

Seed Information

Seeds are very small, almost identical to *C. equisetifolia* except for their lighter colour. Each tree produces large quantities of seed

but they must be collected before the cone-like capsules open as they will be dispersed in the wind. Seed can be stored at least one year if kept cool and dry. Spread seeds on a seed bed, cover lightly with sand and keep moist. Germination occurs in 1 to 2 weeks. They need up to 6 months in the nursery.

Seed Sources

The Silviculturalist, Forest Department, P O Box 74 Kikuyu
Ministry of Energy/EDI, P O Box 30582 Nairobi
The Seedsman, Forest Department Headquarters, P O Box 30241 Nairobi

CHLOROPHORA EXCELSA (Mvule, Iroko)

Local Names

Maruri (Mer), Kitangwe (Kam), Olwaa, Olua (Luo), Mvule (Swa), Mwei (Tav), Iroko (Eng).

Uses

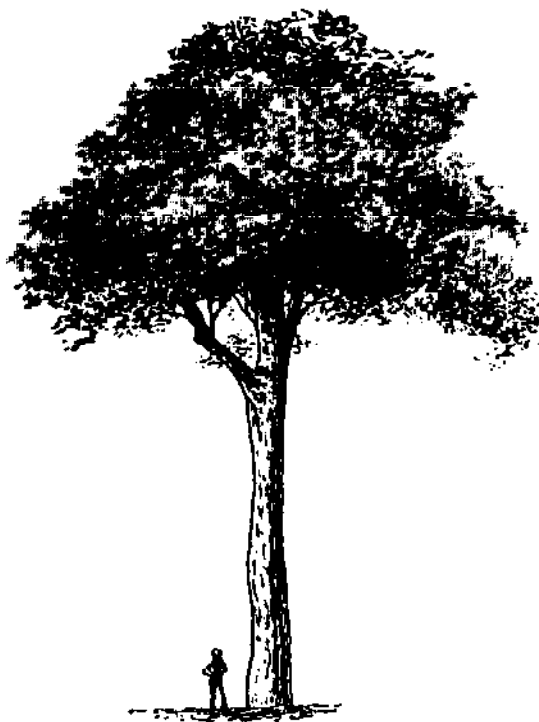
Mvule is one of the most popular timber trees in East Africa. The wood works easily, is heavy, strong and durable. In Kenya it has been widely exploited and is now rare, though some fine specimens can still be seen at the coast. Mvule makes a fine avenue tree for cities and is an excellent shade tree. It grows at a fast rate compared to most hardwoods, and coppices readily, but this can only be called a moderate rate when compared to eucalyptus species. Until the tree reaches 2 metres in height, it is subject to attack by a gall insect. In isolated stands or by itself, these attacks are less likely. Protection from browsing animals is also required.

Preferred Climate Type

Prime growing areas are the Coast, Kwale and Ramisi climate types, and Kakamega climate type. (Zone I, 3-4; II, 1-3; III, 1-3)

Seed Information

Seeds are very small, 100,000 per kilogram, and grow in fruits similar in size and shape to the mulberry. Viability is very short, perhaps



one month. The fruit ferments rapidly on the ground and collection must be done soon



after it falls. Germination is not difficult. Transplanting on a large scale is normally

done with stumps, but on a small scale, normal transplanting works fine. Mvule has both male and female trees, so do not be surprised if seed cannot be found in every tree.

Seed Sources

District Forest Officer, P O Box 16005
Kwale
District Forest Officer, P O Box 460
Kakamega
District Forest Officer, P O Box 110 Meru

CONOCARPUS LANCIFOLIUS

Local Names

Not known.

Uses

Conocarpus is not indigenous to Kenya, but is a well-known riverine species in Somalia. According to Dr Gillett at the National Herbarium, it is one of the fastest growing trees in Somalia, producing large quantities of firewood. It also provides poles and timber, stabilizes river banks and improves soil. It tolerates salt, flood and sand and can grow even on old coral soils. An interesting project started by Rene de Haller at Baobab Farms, North of Mombasa, has *Casuarina equisetifolia* growing on an old coral rock base in a planned mixed forest with Conocarpus. Growth has been impressive and so too has been the production of top soil from leaf fall.

Preferred Climate Type

Conocarpus is almost exclusively a riverine tree of hot, dry areas. It grows well along the Coast and on the River Dawa near Rhamu

and Mandera. It may grow in higher altitudes but this has not been attempted as yet. (Zone III, 1; IV, 1; V, 1; VI, 1; VII, 1).

Seed Information

Seeds are very small and difficult to extract from their covers. Viability is short and germination requires a special technique. At Baobab Farms seed is floated in a small tray



with soil sloped to one end. Seeds germinate while floating then catch on the soil. From there they are pricked into pots until ready for transplanting. Fresh seed is essential.

Seed Sources

Baobab Farm Limited, P O Box 90202
Mombasa
NCKK Rhamu Service Centre P O Box 19
Mandera

COMBRETUM SCHUMANII

Local Names

Mpera-mwiti, Ngurue (Swa) Mgurulu (Bon), Mungulule (Gir), Mlanyika (Nyika).

Uses

Combretum is a large genus with many species. *C. schumanii* was selected because it is the largest of the species, producing the best and most durable timber. Other combretum with good potential include: *C. zeyheri* (Mu-



thithi-Kam), *C. molle* (Ol-mororoi-Mas) and *C. aculeatum* (Kaleda-Bor). All are thickly leaved trees, with small crowns, and good crop association potential. They generally

coppice well, and often grow readily from root suckers. *C. schumanii* grows slowly in dry locations, moderately in moister coastal forests.

Preferred Climate Type

Combretum schumanii is primarily a coastal tree, Kwale, Lamu and Taveta/Isiolo climate types, and up to Kibwezi. Other combretum can be found throughout Kenya, though most are in the semi-arid areas. (Zone III, IV, 1-2; V, 1-2).

Seed Information

Like all combretum, *C. schumanii* seed has four wings. It is light, straw-coloured, about 2.5cm long and 1.5cm wide. The seed flesh is soft and oily, lasting only a short while in storage. It should be sown fresh, after stripping off the seed wings.

Seed Sources

District Forest Officer, P O Box 29 Kilifi
District Forest Officer, P O Box 16005
Kwale

CORDIA ABYSSINICA (Cordia Africana)

Local Names

Muringa (Kik), Akoiyo (Kam), Sonistet (Nan), Mukobokobo (Kis), Mutamari (Luh), Chibulukwa (Sam), Wondesi (Bor).

Uses

Cordia abyssinica makes an excellent agroforestry tree and is widely used in Kenya. The leaves provide a fine mulch. Bees favour the tree for honey production. The timber is of fine grain and texture though only moderately durable. Crops grow well around the tree, and sometimes even in its shade. It is a preferred tree for leaving in pastures and can be seen in these locations along the main road to Nyeri. The growth rate is moderate to slow depending on conditions.

Preferred Climate Type

Common trees in Nairobi and Kakamega climate types. (Zone I, 3-5; II, 3-5; III, 3-5).



Seed Information

Seeds are round to oblong, about 1 cm in length, perhaps 3,000 per kilogram. Seeding time is highly variable but August-September,



appears the best. Seeds remain viable for at least a year; storage beyond that is not recommended. Seeds are normally sown directly in beds, germination beginning in two weeks. Seedlings require 4-6 months in the nursery.

Seed Sources

Ministry of Energy Agroforestry Centre,
Wambugu FTC P O Box 899 Nyeri
District Forest Officer, P O Box 28 Nyeri
District Forest Officer, P O Box 460
Kakamega
District Forest Officer, P O Box 775 Kisii

CROTON MEGALOCARPUS (Mukinduri)

Local Names

Mukinduri (Kik), Marabai (Mer), Muthulu (Kam), Ol-nrergoit (Mas), Musineitet (Nan), Musine (Luh), Lameanguet (Sam), Nyafo (Bor).

Uses

Croton megalocarpus is one of the most common trees in the Kenyan highlands and midlands. It provides good fuel but the charcoal smoke can hurt the eyes. It is a common tree in grazing systems but is not recommended near maize because of the broad shade. Leaves provide a good mulch. The bark of mukinduri has medicinal properties. It is crushed and boiled and when cool, drunk to cure stomachache and relieve pneumonia. Seeds are 30% oil and 50% protein which gives it potential as an industrial crop. *Croton* grows quickly in zone II-III.

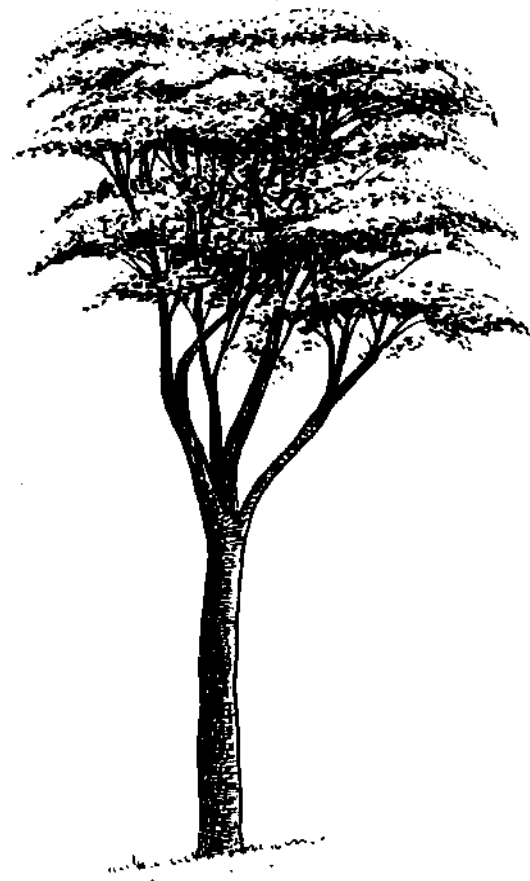
Preferred Climate Type

Croton grows over a wide area but does best in the Nairobi and Limuru climate types (Zone I, 3-6; II, 3-6; III, 3-6; IV, 3-4).



Seed Information

Even the name, *C. megalocarpus*, refers to the large seeds produced in great quantities. There are slightly fewer than 1000 seeds per kilogram. Many of the seeds collected from the ground after falling are found to be hollow. Floating the seed before sowing is essential. Germination is usually quick with



no pre-treatment required. *Croton* seeds fall in October-November in Central province, and January-February in Western Province.

Seed Sources

Ministry of Energy/EDI Seeds, P O Box 30582 Nairobi

Kibiko Primary School Agroforestry Project,
c/o Mazingira Institute, P O Box 14550
Nairobi

Ministry of Energy Agroforestry Centre,
Ngong, P O Box 30582 Nairobi

Wambugu Farmers Training Centre, P.O
Box 899 Nyeri

The Forester, P O Box 28 Nyeri

District Forest Officer, P O Box 74 Kikuyu
The Silviculturist, Forest Department,
P O Box 74 Kikuyu

DALBERGIA MELANOXYLON (Mpingo, African Blackwood)

Local Names

Mwengo (Mer), Mvingo (Kam), Opok (Luo), Mpingo (Swa), Mboronguluwe (Dig), African Blackwood (Eng).

Uses

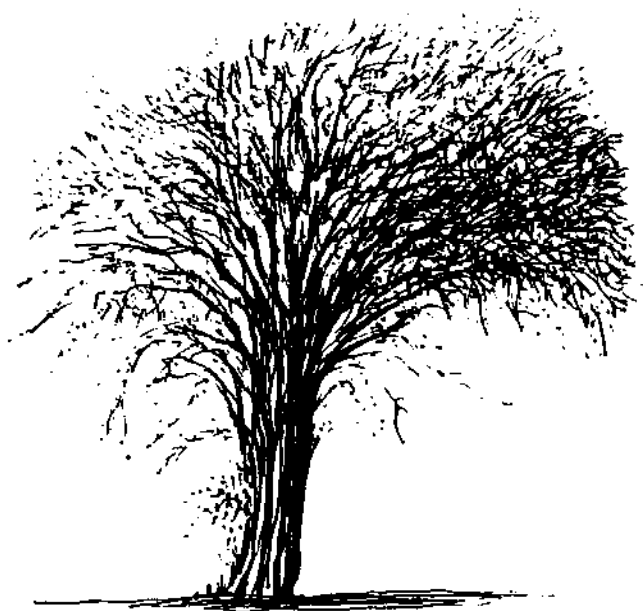
Mpingo produces what is probably the most valuable timber by weight and volume in East Africa. The heartwood is hard, heavy and very durable. In fact, it can be regarded as ant and beetle proof. A prized wood among Kamba carvers and European instrument makers (black piano keys and clarinets), the tree has been reduced greatly in numbers. Because of the high economic return on only a small quantity of the slow growing timber, it is recommended that people keep a small number on their shambas as a future investment.



The tree is thorny and the leaves make good mulch. It may be nitrogen-fixing as well, though this is not confirmed.

Preferred Climate Type

African Blackwood's original range has been reduced because of its valuable timber. It grows best in sub-humid and semi-arid areas such as Lake Victoria/Thika, Kajiado and Taveta/Isiolo climate types. Many trees can



be found in the valleys east of Kitui Town. (Zone III, 1-3; IV, 1-3; V, 1-3; VI, 1-2)

Seed Information

Seeds are produced in papery pods 1-4 per pod. They are small, kidney shaped and flat, very fragile when dry and difficult to separate from the pod. Little is known about germination rates, sowing technique or whether it has ever been grown in a nursery.

Seed Sources

District Forest Officer, P O Box 106 Kitui
District Forest Officer, P O Box 2 Machakos
Ministry of Energy Agroforestry Project c/o
Better Living Institute, P O Box 683 Kitui
Mr Gideon Kinai, Kaewa Agroforestry
Committee, c/o Mazingira Institute, P O
Box 14550 Nairobi

DOMBEYA GOETZENII

Local Names

Mukeu Mukao (Kik. Mer), Sibukuet (Nan), Boloet, (Elg), Silibuet (Dor), Boroa (Kamas), Borowa (Mar), Olsbukiau (Mas).

Uses

When the Forest Department goes to look for high quality soil for use in their nurseries, often they find it by looking first for *Dom-*

beya goetzenii. Mukeu has large, dark-green leaves which fall often enough to keep the ground underneath well coated with top quality mulching material. The wood is lightweight, strong, easy to work, though not durable. This tree is recommended for growing near cultivated areas, but not with crops as the shade is too dense. The traditional Kikuyu rope is made with bark fibre.

Beehives are often kept in this tree as the bees are attracted to its flowers.

Preferred Climate Type

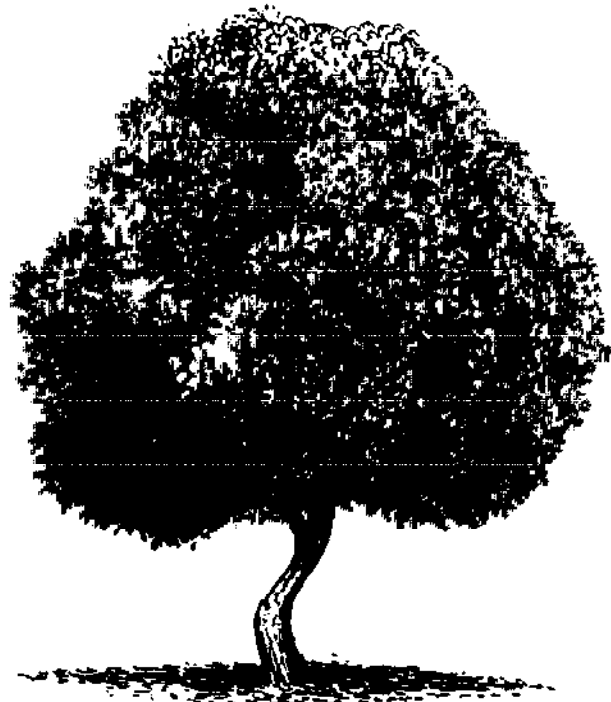
Found almost exclusively above 2000 metres in moist forest; Kericho, Limuru and Mountain climate types. (Zone I, 5-8; II, 5-8).

Seed Information

Seeds are fairly small, found in a pod-like three-sided capsule containing 10 seeds. It can be sown in seed beds without pre-treatment. Viability information and nursery time requirements are unavailable at present.

Seed Sources

The Seedsman, Forest Department Headquarters, P O Box 30513 Nairobi
District Forest Officer, P O Box 8 Laikipia



Likia Forest Station, P O Box 134 Njoro

ERYTHRINA ABYSSINICA

Local Names

Muhuti (Kik), Mvuti, Kivuti (Kam), Oding, Mrembe (Luo), Olepangi (Mas), Kaguruet (Nan), Mwamba-ngona (Swa), Murembe (Luh), Garacha (Sam), Kokorwo (Pok), Red Hot Poker (Eng).

Uses

Erythrina abyssinica is one of the most widespread trees of Kenya. Called the red hot poker tree, it is commonly used ornamentally. It can often be seen almost without leaves, as it is deciduous, and provides mulch. It may also be nitrogen-fixing but



this has not been confirmed. The wood is soft, easily carvable but not so good as its near relative *E. rotunda-obovata* (Walensu-Bor, Buri-Som), growing in the North Eastern Province where it is made into camel bells and milk containers.

Preferred Climate Type

Grows very well in most climates except very dry or high areas. (Zone I-IV, 1-6).

Seed Information

Seeds are a shiny bright red with a black spot, shaped like a 1cm long rugby ball. They can be stored for a long time without losing viability if kept cool, dry and insect free. Sowing does not require pre-treatment. The most common method of reproduction is by large cuttings, stripped of leaves, planted directly in the location desired at the beginning of the rains.

Seed Sources

EMI Forest Project c/o Provincial Forest Officer, P O Box 2 Embu
District Forest Officer, P O Box 2 Machakos



A Galla water cup with grooved handle

EUCALYPTUS CAMALDULENSIS (Red River Gum)

Native Range

Red River gum, as it is called in Australia, grows widely throughout that country especially along river courses in drier regions.

Uses

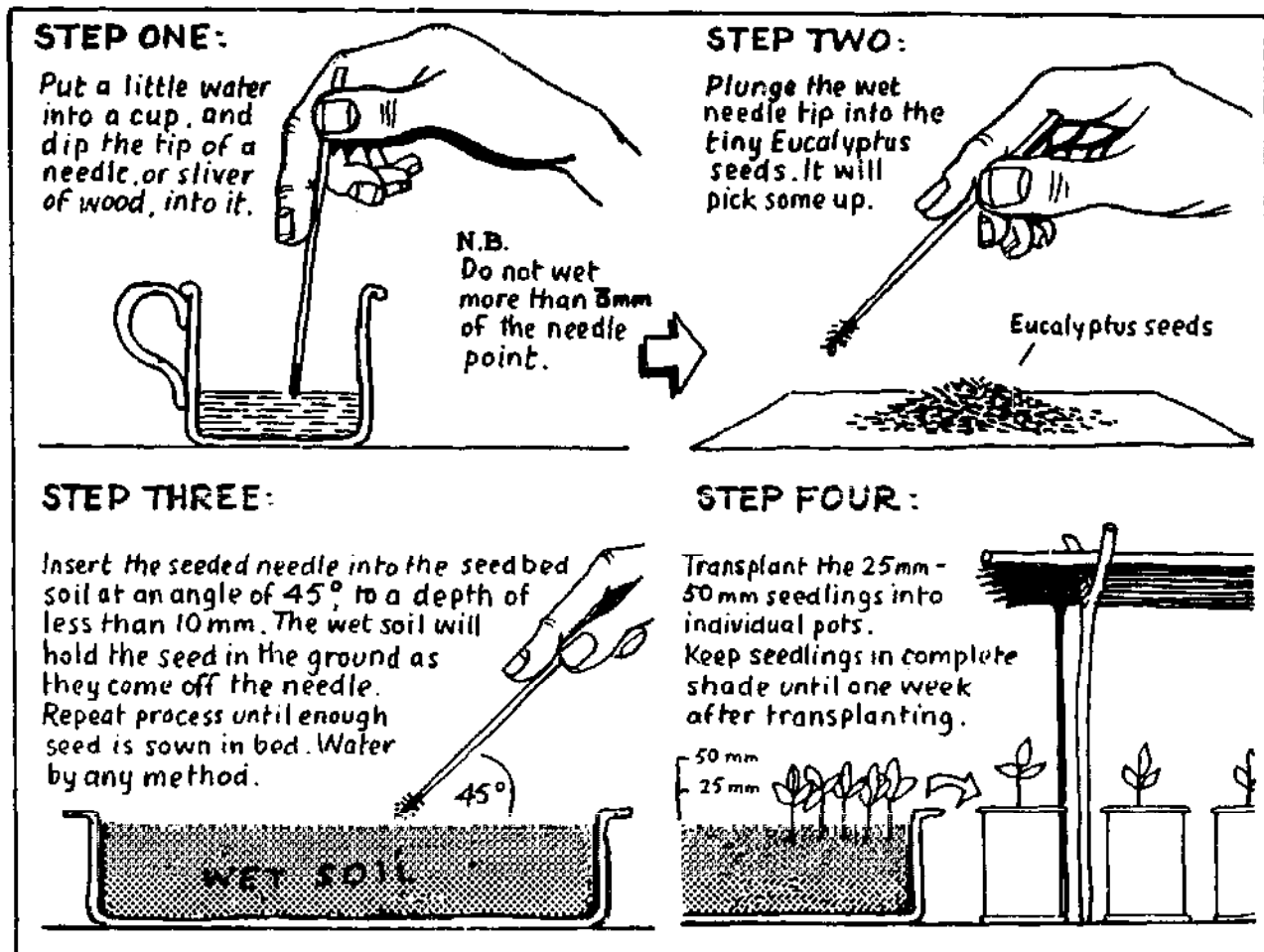
E. camaldulensis is one of the world's most widely planted trees, primarily in semi-arid and Mediterranean climates. It provides heavy, dense red wood which is termite resistant, though sawn boards warp easily. Bees produce good quality honey from the flowers. It makes a good wind-break, tolerates waterlogging and drought and grows quickly to make good firewood, and charcoal. Red river gum coppices well and in prime locations can be harvested up to 6 times on a 7-10 year coppice rotation. It can grow to 40 metres, having a thin crown and smooth but patchy bark.

Preferred Climate Type

This gum is best suited to areas having over 50cm of rain and dry seasons for not more than eight months' duration. Lake Victoria/-Thika, Taveta/Isiolo and Kajiado climate types are best. It also does well in all coastal climates. Drier areas show limited growth and dieback problems (Zone III, 1-3; IV, 1-3; V, 1-3).

Seed Information

E. Camaldulensis seeds are very small, with over 700 potentially germinating seed in each gram. Because of the small size of eucalyptus seed for almost all species, a special technique is needed. The method given here was designed especially for small-scale nurseries and is taken from the VITA publication, *Reforestation in Arid Lands*, written by Fred Weber. There are four simple steps:



Red river gum needs 4 to 6 months in the nursery.

Seed Sources

EMI Forest Project c/o Provincial Forest Officer, P O Box 2 Embu
Ministry of Energy Agroforestry Project,

c/o Better Living Institute, P O Box 683
Kitui

Provincial Forest Officer Coast, P O Box
80078 Mombasa
The Silviculturalist, Forest Department,
P O Box 74 Kikuyu

Note

Eucalyptus species are all exotics from Australia which have been widely planted around the world. Most of these have been used for forestry plantation species. In general, they are fast growing hardwoods, though some have other uses. Kenya supports over 100

species of eucalyptus, many of which are in plots at Muguga. They do have one major drawback: a limited or even harmful effect on yields in cultivated areas and pastureland. However, in certain cases the benefits outweigh this disadvantage.

EUCALYPTUS CITRIODORA (Lemon Gum)

Native Range

Probably the easiest of the eucalyptus to identify, the leaves of *E. citriodora* are long and narrow with a strong lemon scent. The tree comes from Queensland, Eastern Australia.

Uses

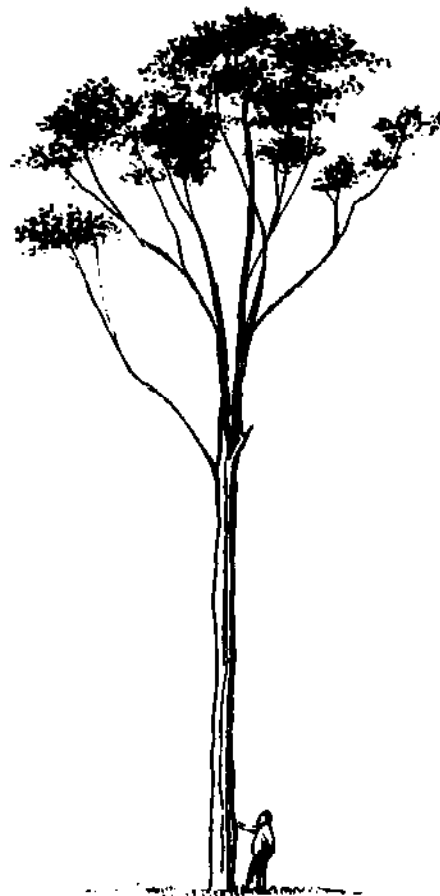
Lemon gum is quite common in East Africa, being used primarily for heavy-duty sawn timber and firewood. It grows to 40 metres with a straight trunk. The wood is heavy and durable. As its large branches are brittle and frequently break off in high winds, it is a tree one would not like close to houses. It can be cut for poles and fuel before reaching brittle-branch dimensions, and it coppices well. It prefers laterite soils. As with many eucalyptus, young seedlings are susceptible to termite damage.

Preferred Climate Type

Has a very wide range of climates but does best in the Kisumu/Muranga type. It needs about 900 mm rain annually and tolerates up to 7 months drought. (Zones II 1-4, III 1-4; IV 1-4).

Seed Information

Lemon gum is not a prolific seeder, some



years producing no seed at all. Seeds are large compared to most eucalyptus, there being potentially 110 germinating seed per gram. Germination percentage of these 110 is generally high. (See *E. camaldulensis* for storage and sowing instructions).

Seed Sources

The Silviculturist, Forest Department, P O
Box 74 Kikuyu
The Seedsman, Forest Department, P O

Box 30513 Nairobi
EMI Forest Project c/o Provincial Forest
Officer, P O Box 2 Embu

EUCALYPTUS MICROCORYS

Native Range

Another East Australian eucalyptus, *E. microcorys* is best identified by its soft, spongy bark. It can be found along the roadside in Nyeri.

Uses

E. microcorys grows only moderately fast in basically the same areas as *E. saligna*. It has a dense crown, and soft dark grey-brown bark. The wood is hard, strong, durable, termite-resistant, yielding good hardwood and excellent fuelwood. The chief advantages are its termite resistance when young and its superior timber. It can substitute for *E. saligna* if termites are a problem.

Preferred Climate Type

This eucalyptus does very well in Nyeri, Eldoret areas, Nairobi climate type and in other moist highland areas; II, 4-6; III, 4-6).

Seed Information

Seeds come 230 per gram and are relatively easy to start. (See *E. camaldulensis*).

Seed Sources

District Forest Officer, P O Box 28 Nyeri
The Silviculturist, Forest Department,
P O Box 74 Kikuyu
The Seedsman, Forest Department P O Box
30513 Nairobi
Ministry of Energy Agroforestry Centre,
Ngong, P O Box 30582 Nairobi

EUCALYPTUS MICROTHECA (Coolabah)

Native Range

Coolabah, as the Australians call it, grows over a wide range of dry land in that country.

Uses

E. microtheca is perhaps the most drought-tolerant and heat-resistant of the eucalyptus. It has been grown successfully on irrigated plantations in Sudan's Gezira scheme where it gets no water during the five hottest months. It grows fast, but only to 15-20 metres, with poor shape and coppices only passably. The fuelwood produced is excellent. Coolabah is flood resistant and grows well in heavy black cotton or calcareous soils. It is also useful for soil stabilization, erosion control and shade.

Preferred Climate Type

Prefers hot, dry, semi-arid climates like



Lamu and Taveta/Isiolo. Will do well in drier types if in a riverine setting. (Zone III,

1-3; IV, 1-3; V, 1-3; and riverine VI, 1-3; VII, 1-2).

Seed Information

Seeds are abundant in season (which is not known in Kenya) and there are 400 per gram. (See *E. camaldulensis* for storage and planting information).

Seed Sources

The Silviculturist, Forest Department,
P O Box 74 Kikuyu
EMI Forest Project c/o Provincial Forest
Officer, P O Box 2 Embu

Note

Two other eucalyptus are recommended for the highlands:

1. *E. paniculata*—called grey ironbark, it grows well but not fast, producing heavy construction timber, poles and top quality fuel wood.
2. *E. regnans* for the cooler, moist highlands 2,400 metres. Very fast growing, at South Kinangop it reached 80 metres in 30 years.

Another dry area eucalyptus available in Kenya is *E. tereticornis*. Zone II-V, 2-4. Good for heavy timber, poles and fuelwood.

EUCALYPTUS SALIGNA (*E. grandis*/Blue Gum)

Native Range

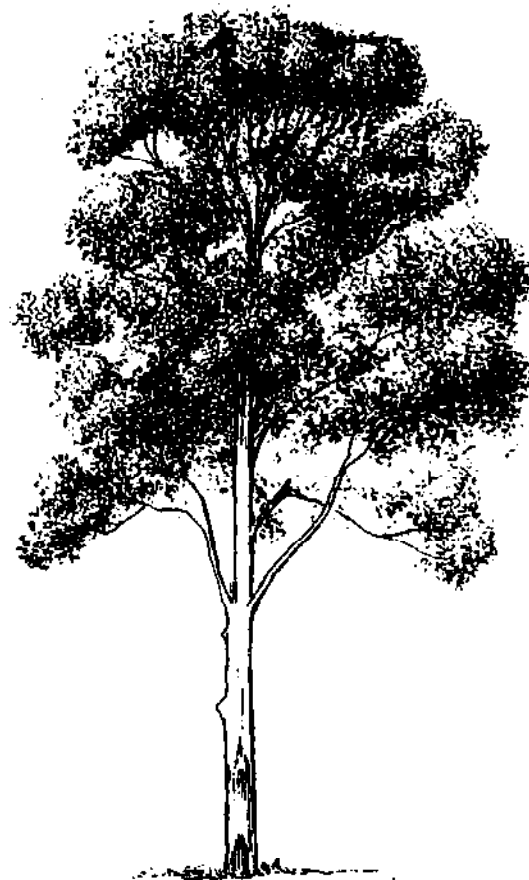
This straight white-boled gum is the most widely planted of all eucalyptus in Kenya. It comes from the coastal areas of East Australia. *E. saligna* in Kenya may be a hybrid with *E. grandis*, which explains, in part, the confusion over botanical names. The Kenya trees all come from plantations started in South Africa during the 19th Century.

Uses

Blue gum produces more fuelwood at a faster rate than any other tree now planted in Kenya. Data from Muguga indicates that a plantation yields 178m³ per hectare after six years and 277 m³ after an additional six years from coppices. Although the wood is easy to work and is used as general purpose timber in Kenya, fuelwood is its most important use. Blue gum adversely affects crop yields, especially maize. It is best to plant in small woodlots or on shamba borders. In Western Kenya, it is commonly planted along roadsides. Very susceptible to termites in the first two years.

Preferred Climate Type

Does very well in most of the wetter midland to highland climate types; Nairobi, Kakamega, Migori, Limuru, Kericho, Eldoret, and even Kisumu/Murang'a. In the mountain climate type *E. regnans* is a fast growing substitute. In Kisumu/Murang'a climate



type *E. citriodora* grows at an equal or faster rate. (Zone I, 1-6; II, 1-6; III, 1-6).

Seed Information

Seeds are very small, 600 per gram (See *E. camaldulensis* for further information).

Seed Sources

The Silviculturist, Forest Department, P O

Box 74 Kikuyu.
The Seedsman, Forest Department, P O
Box 30513 Nairobi
Ministry of Energy Agroforestry Centre,
P O Box 23 Bukura
District Forest Officer, P O Box 775 Kisii
District Forest Officer, P O Box 281 Nakuru

District Forest Officer, P O Box 28 Nyeri
District Forest Officer, P O Box 110 Meru
District Forest Officer, P O Box 28 Eldama
Ravine

The Forester, Wire Forest Station,
P O Box 60 Oyugis

FAUREA SALIGNA

Local Names

Muto, Murango (Kik), Ol-orten (Mas), Mosa-bonet (Nan), Muargua (Seb), Makwa (Kam), Maiyokwa (Mar), Siriki (Elg) Olbugui (Sam), Nkoma, Mukogodo, Muanjate (Mbeere).

Uses

Faurea is normally not a big tree, nor fast growing, yet in areas where it is found, it has a high cultural value, often for ceremonial purposes. The timber is strong and durable and useful for rough indoor furniture and panelling, but it can pick up dirt easily. It does yield a high quality charcoal. It is also good for honey production and associates well with crops. A related species called *Faurea speciosa* (Mugonju—Luh) which grows around Mt Elgon and Kakamega is also a good tree.

Preferred Climate Type

Primarily found on the eastern slopes of Mt Kenya, Limuru and Kericho climate types. It can grow in lower, drier areas Kisumu/Murang'a climate type. (Zone I, 3-8; II, 3-7; III, 3-6; IV 3-4).

Seed Information

The seed is quite small and covered with white hairs. East of Mt Kenya the seed is



ready around March. It is said by the Mbeere people to have poor germination.



Fresh seed is essential as viability information is not yet available.

Seed Sources

District Forest Officer, P O Box 2 Embu
District Forest Officer, P O Box 110 Meru
Siakago Primary School, Agroforestry
Committee c/o Mazingira Institute, P O
Box 14550 Nairobi



Traditional Bee-hive

FICUS NATALENSIS (Mugumo)

Local Names

Simotuet (Nan. and Seb), Ol-endeti (Mas), Lutoto (Luh), Lubuli (Sam), Mugumo (Kik), Omugumu (Kis), Kiumo (Kam), Mrumo (Luo), Arabi (Swa), Bark Cloth Fig (Eng).

Uses

Figs are not regarded as a good firewood species, and *Ficus natalensis* is no exception. It does have a variety of other uses which make it an interesting agroforestry species. Traditionally *F. natalensis* is held as sacred by the Kikuyu. In Uganda it is the primary supplier of bark cloth, pounded with a grooved mallet to give it the appearance of corduroy. It also makes a good living fence and a shade tree for coffee. It has potential as a mulch and a shade tree in grazing areas.

Preferred Climate Type

A widespread fig of the moister highland areas, especially in Kakamega, Migori and Limuru climate types (Zone I, 3-5; II, 3-5; III, 3-5).



Seed Information

Many figs have an unusual method of propagation. Birds, such as barbets and green pigeons, consume the fruits and deposit seed



by droppings, often on to other trees. The seeds then germinate and rely on the host tree for nutrients until their own roots have reached the ground. Then they grow, usually killing off their host. The bark cloth fig is similar. This makes for difficulty in seed collection and germination. However *F. natalensis* can be easily reproduced from large cuttings or stakes, a better method than propagation from seed.

Seed Sources

It is best to obtain cuttings rather than grow the tree from seed, therefore we do not list any seed sources here.

GLIRICIDIA SEPIUM

Native Range

A Central American native which is now naturalized in the West Indies and Philippines. Recently it has been introduced to Kenya.

Uses

Gliricidia has many uses, probably the most important being a living fence and firebreak.

It is often used for firebelts around forests and farms as it is nearly 'fireproof' when living. As a nitrogen fixer and a fodder it is valuable for its leaves (bark, roots and seeds are poisonous. Leaves are toxic to non-ruminants like donkeys and horses). Flowers are attractive and make good bee forage. The tree is deciduous, valuable as a mulch. The timber is also good quality. The wood is

hard, heavy, termite-resistant, durable and good for fuel. *Gliricidia* coppices and produces large quantities of trimmable wood.

Preferred Climate Type

Gliricidia does quite well at the coast in the Kwale climate type, and shows promise in the Kakamega type. It grows to 1600 metres in Central America. (Zone I; 3-4; II, 1-3; III, 1-3 and sometimes drier).

Seed Information

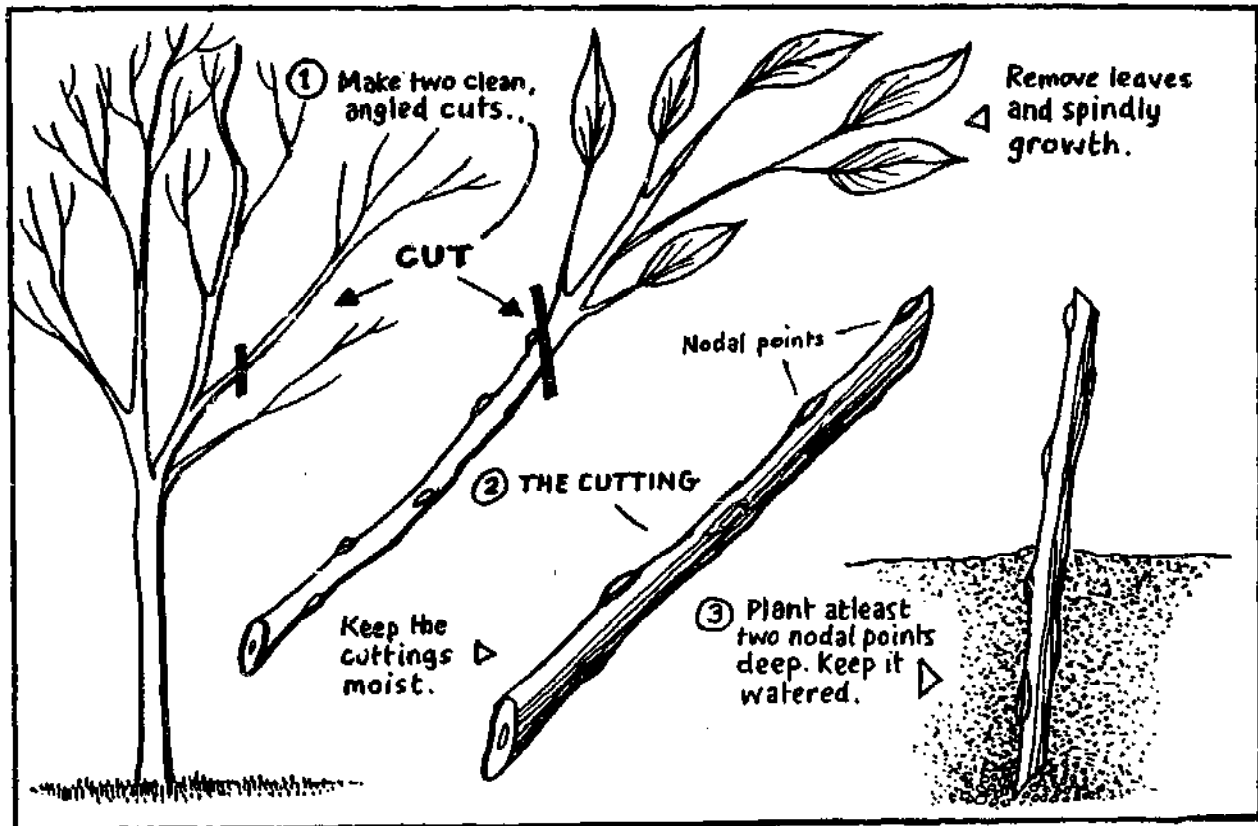
Seeds are about 1 cm long, flat, similar to some acacia. They should be soaked before sowing. The most common way to propagate is by cuttings, even 2 metres long, which root easily if the soil is wet. The seed sources

below are mainly for cuttings as trees are usually trimmed before seeding. Plant cuttings within one week of removal from the tree.



Seed Sources

Shimo-la-Tewa Annexe Prison, P O Box 90152, Mombasa (for cuttings only)
Matuga Research Station c/o District Agricultural Officer, P O Box 2 Kwale
Mtwapa Agroforestry Centre, P O Box 90290 Mombasa



GMELINA ARBOREA

Native Range

Gmelina is native to the moister forest of South Asia, from India through Southern China. It has been planted in many places worldwide, but only recently in Kenya.

Uses

Gmelina produces a relatively lightweight general purpose timber, useful for carpentry, furniture, plywood and matches. It also provides high quality pulp for paper manu-

facture. Bees are attracted to the flowers which produce abundant nectar. The principal use for gmelina is as fuelwood. It grows quickly, coppices well and can be harvested as early as five years after planting. It can be grown with crops at a wide spacing. Narrow (2 by 2 metres) spacing shades out crops after the first year. The tree must be protected from livestock when young.

Preferred Climate Type

Basically a coastal tree, Ramisi, Kwale and Lamu climate types. It is under trial in Kakamega district. (Zone I, 3-4; II, 1-3; III, 1-3 IV, 1-3).

Seed Information

Fruits are about 2.5 cm long, shaped like an egg, and turn orange when ripe. The large stone contains 1 to 4 seeds of which there are 2,000 - 3,000 per kilo. Seeds remain viable less than one year. They can be sown direct

in pots after soaking 24 hours. Growth is quick—seedlings can be trans-planted after



3 months. It is recommended to grow gmelina in cropped areas during its first year at least, since it does not compete well with weeds.

Seed Sources

District Forest Officer, P O Box 24 Kilifi
The Silviculturist, Forest Department, P O
Box 74 Kikuyu
The Seedsman, Forest Department, P O
Box 30513 Nairobi
Mtwapa Agroforestry Centre P O Box 90290
Mombasa

GREVILLEA ROBUSTA (Mkima Grevillea or Silky Oak)

Native Range

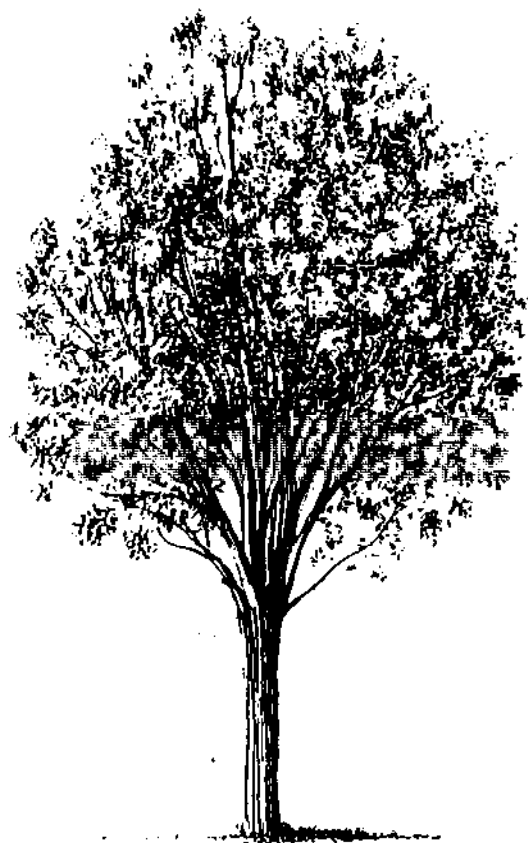
This is one of many exotics imported from Australia, where they are found in a small subtropical region of Queensland and New South Wales. It now grows in many parts of East Africa. The Australians call it Silky Oak and the Kikuyu have dubbed it *Mkima*.

Uses

Probably the most useful of the imported species, grevillea was brought to Kenya for use as a coffee and tea shade. It can be grown in shambas with any crop with no negative effect. Mulch is good and it can be lopped to prevent excessive side branch shading. Numerous orange flowers are almost continually in bloom on the tree, and bees frequent them. Timber has a good grain, works well but picks up when planed. It can be used for cabinets, furniture and heavy construction. The major wood use, however, is for fuel. Growth is moderate to fast.

Preferred Climate Type

Grevillea has a very broad range of climate types, thriving in coffee and tea areas as well



as in the Lake Victoria/Thika type. It does well on Mount Marsabit, around Meru and

Kakamega. (Zone, I, 3-6; II, 3-6; III, 3-5; IV, 3-5).

Seed Information

Seeds are soft, waferlike with wings, about 1 cm in diameter, perhaps 20 000 or more per kilo. Two seeds are borne in capsules, which open while still attached to the tree. To collect, remove the seed capsules just after they



turn brown and let them dry and open away from the wind. Viability is short, about 3 months. The fresher the seed the better the germination. Seeds need no pre-treatment, but germination is variable, anywhere from 1 to 6 weeks. The seedlings need at least 4 months in the nursery before transplanting.

Seed Sources

District Forest Officer, P O Box 110 Meru
District Forest Officer, P O Box 775 Kisii
District Forest Officer, P O Box 28 Kapsabet
Nyeri Agroforestry Committee, c/o Mazingira Institute, P O Box 14550 Nairobi
The Landscape Officer, P.O. Box 30075, Nairobi (for permission to collect seeds at the Arboretum)
Ministry of Energy, Agroforestry Centre, c/o Wambugu Farmers Training Centre P O Box 29 Nyeri
Ministry of Energy Agroforestry Centre, c/o Kisii Farmers Training Centre P O Box 52 Kisii
EMI Forestry Project c/o Provincial Forest Officer, P O Box 2 Embu
Mr Ayub Ogweno, Koderia Nursery, Wire Forest Department, P O Box 60 Oyugis
The Seedsman, Forest Department, P O Box 30513 Nairobi

HARUNGANA MADAGASCARENIS

Local Names

Mwitathoa (Kik), Munyamwe (Mer), Aremo (Luo), Chepsebi (Nan), Mpulapula (Swa), Musira, Namusabi (Luh) Msaki (Tiriki), Mukokosoka (Dig).

Uses

Harungana is one of many species which act as pioneers on newly cleared land. It is, or perhaps was, a common tree on the edge of forests, noted for its blood-red sap. Its fruit is small orange or yellow-brown and edible. The wood is light-coloured and fairly light in weight, but useful and reasonably durable.

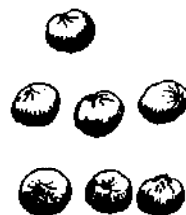
Preferred Climate Type

Harungana is primarily a tree of wet forests, being most common near the Kakamega Forest. Its peak climate types are Kakamega and Kericho (Zone I, 3-6; II, 3-6; III, 3-6).

Seed Information

Seed is a hard 'stone', fairly small with five in each fruit. The seed flesh is soft and it probably has a short viability, though this needs

confirmation. Information on pre-treatment and required nursery time is unavailable.



Seed Sources

District Forest Officer, P O Box 376 Siaya
District Forest Officer, P O Box 66 Homa Bay
District Forest Officer, P O Box 775 Kisii
District Forest Officer, P O Box 460 Kakamega
District Forest Officer, Nandi, P O Box 28 Kapsabet
The Silviculturist, Forest Department, P O Box 74 Kikuyu
The Forester, Wire Forest, P O Box 60 Oyugis
District Forest Officer, P O Box 110 Meru

HYPHAENE CORIACEA (Doum Palm)

Local Names

Mkoma, Mlala (Swa), Auwaki (San), Medi, Orniga (Bon), Irara (Tav), Kone (Bor), Bar (Som), Mlala (Gir). Doum Palm (Eng).

Uses

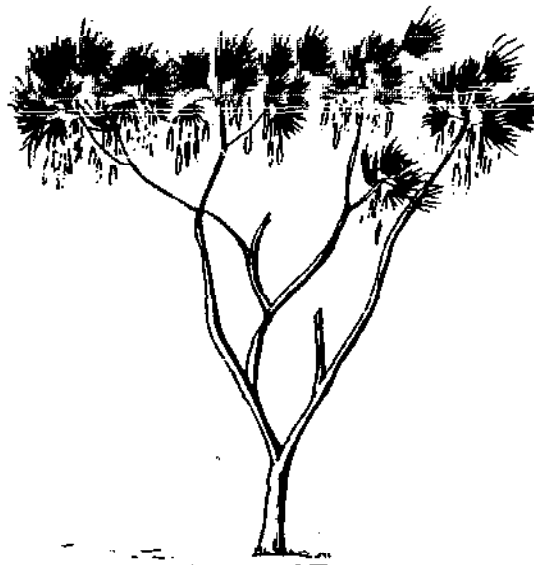
The doum palm is the only species of palm which regularly branches. Its long slender stem and V-branches give it an attractive appearance. In the riverine desert zone, where it thrives, doum palms are often the tallest tree. The outer cover of the fruit is edible, but more palatable to baboons and elephants than people. Experiments in West Africa on the seed oil show that it can be burned in diesel engines, though commercial production may not be profitable. Its major uses are as leaf fibre for mats and baskets (a factor which sometimes leads to its demise) and as construction posts for houses.

Preferred Climate Type

Doum palms need a hot climate and a high water table, but do not need high rainfall. It is most prominent along permanent and seasonal rivers in the Wajir and Magadi/Garba Tula climate type. (Zone III, 1-2; IV, 1-2; V, 1-2; VI, 1-2; VII, 1-2).

Seed Information

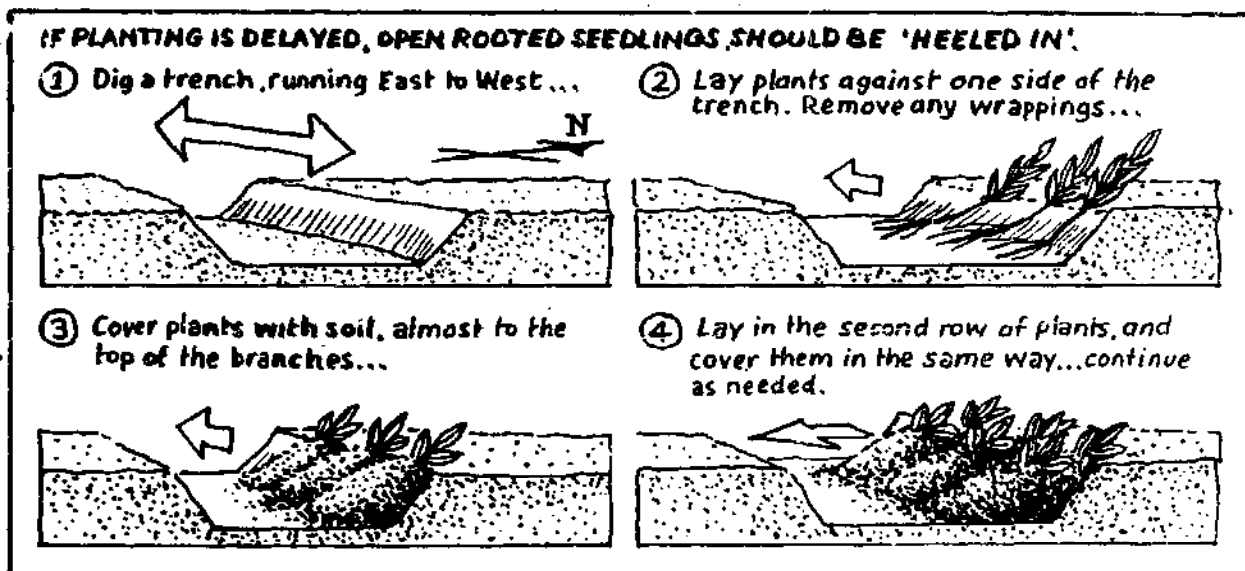
The fruit is large, about 200 grams when fresh, containing one seed. It must be sown



direct at the place desired. Viability is short. Natural germination occurs best after the seed has passed through the bowels of an elephant. To simulate this, soak seed in a bath of weak hydrochloric acid for about 20 minutes. This procedure should be done only by those with experience. Germination is fairly good after this.

Seed Sources

District Forest Officer, Turkana P O Lodwar
District Forest Officer, P O Box 8 Mandera
NCKK Rhamu Service Centre P O Box 19 Mandera
Garba Tula Secondary School Tree Club, P O Box 84 Isiolo



JUNIPERUS PROCERA (Pencil Cedar)

Local Names

Mutarakwa (Kik), Mudarakwa (Kam), Entaraguai (Mas), Turkwet (Nan), Deyib (Sem), Tarakiyie (Sam), Etheiyeiit (Turk), Teet (Pok), Terokwa (Elg and Mar), Aru (Bor) Pencil Cedar (Eng).

Uses

East African pencil cedar is the dominant tree in most drier high altitude forest and is of great economic importance. The red heartwood splits easily and is highly termite-resistant. It makes excellent fence posts, siding, shingles and light utility wood where durability is required and of course, it can also make good pencil wood and matches. It grows more slowly than the similar looking cypress, but has a broader range of uses. Faster growth occurs in open stands, free from light competition. It should not be grown in a cropped area, as leaf-fall is too acid, but can be grown around the shamba border.

Preferred Climate Type

Pencil cedars are found over a wide variety of climate types but best growth appears to be in the Eldoret climate type, especially in areas like Maraial and Ol Arabel Forest. (Zone II, 3-7; III, 3-7; IV, 3-6).

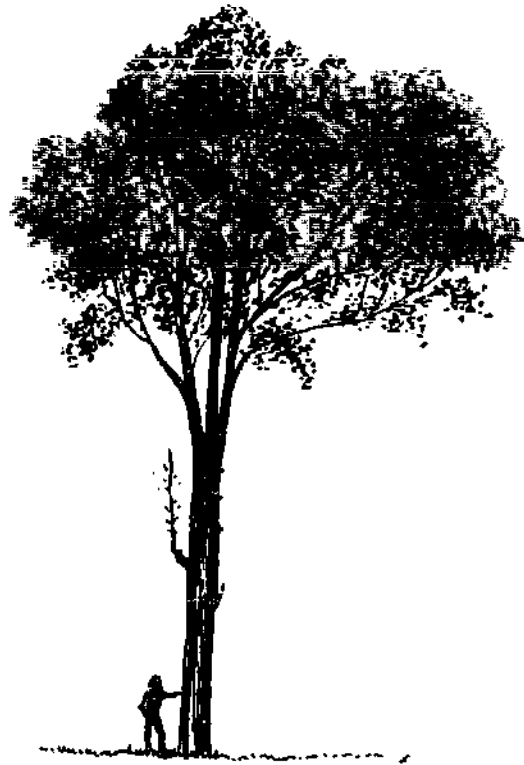


Seed Information

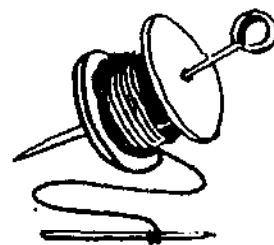
The blue-when-ripe fruit is about pea-sized and contains 2-3 seeds. These can be sown in seed beds, like cypress, and transplanted to pots. Seed viability is not a problem if less than a year old or when kept stored in a cool, dry place.

Seed Sources

District Forest Officer, P O Box 8 Nyahururu
District Forest Officer, P O Box 110 Maralal



District Forest Officer, P O Box 34 Narok
District Forest Officer, Elgeyo Marakwet
P O Iten via Eldoret
Ministry of Energy/EDI, The Seedsman,
P O Box 30582 Nairobi
District Forest Officer, P O Box 19 Elburgon
The Forester-in-charge, Baraget Forest
Station, P O Box 19 Baraget
The Forester, Likia Forest Station, P O Box
134 Njoro
Ministry of Energy, Agroforestry Centre,
P O Box 29 Nyeri
The Forester, Gathiuru Station P O Box 185
Nanyuki
The Forester, Mariashoni Station, P O Box
19 Elburgon
The Forester, Kinale Station, P O Box 56
Matathia
District Forest Officer, P O Box 41 Eldoret



LEUCAENA LEUCOCEPHALA

Native Range

Originally from the drier western side of Central America, leucaena is now perhaps the most widely spread exotic in the tropics. It has become indigenized in the Philippines, Indonesia, Hawaii and even the Kenya coast.

Uses

There is little doubt that leucaena is a very useful, very fast growing tree. Yields of wood from leucaena on an annual basis by volume exceed that from almost every other tree. Considerable research has been done on the tree, which can make selection of the right variety difficult. Varieties K8, 28 and 67 (and many others) are giant types, producing fuelwood, timber, shade and wind-breaks, as well as fodder and nitrogen-rich, green manure. Varieties Peru and Cunningham are primarily fodder producers. (Over-feeding cattle or goats with leucaena can cause problems due to the mimosine content. Rabbits should not have more than 20% Leucaena and chickens 5%). Leucaena tolerates poor soils and steep slopes. It coppices readily and recovers quickly from die-back caused by drought or hungry goats. Browsing animals can cause many problems.

Preferred Climate Types

Leucaena has an undeserved reputation for drought tolerance. It does best near the coast and in places like Kitui, Kisumu/Murang'a climate types. It does not grow well in areas

of cool temperatures (Nairobi) or places with droughts of four months or more. (Zone I, 1-3; II, 1-3; III, 1-3; IV, 1-3). (Note: with some irrigation, it will grow well in drier zones. This is only recommended in places with easy access to water.)

Seed Information

Leucaena seeds prolifically, especially the fodder varieties, even in the first year. It is best to get seeds from trees about 2 years old.



Soaking or nicking speed germination. Seeds store well. Growth in the nursery is very fast, 10 weeks being sufficient.

Seed Sources

Baobab Farms Limited, P O Box 90202, Mombasa (K8, k28)

EMI Forestry Project c/o Provincial Forest Officer P O Box 2 Embu

East Pokot Agricultural Project, Kositei Catholic Mission, Nginyang via Nakuru, P O Marigat

Ministry of Energy Agroforestry Centre, Mtwapa, P O Box 90290 Mombasa

Ministry of Energy Agroforestry Centre, Ngong, P O Box 30582 Nairobi

MAESOPSI EMINII (Musizi)

Local Names

Muhunya, Mutere (Luh).

Uses

Maesopsi eminii is one of the few indigenous trees used in plantation forestry. It grows quickly, with a straight bole and prunes itself. The timber is white, of medium weight, good for general purpose wood. Unlike most



of the exotic plantation species, *M. eminii* does intercrop well, and has been grown as a shade tree for coffee and tea. It has little effect on surrounding crops when small, but shade is probably too heavy for maize when

the tree becomes large. Muhunya can be harvested for timber on a 30 year rotation.

Preferred Climate Type

Maesopsis grows best in lower moist forest such as in Kakamega climate type. It also does well in Migori and Limuru types, Taita Hills for example (Zone I 3-5; II 3-5; III 4-5).

Seed Information

The hard, 2cm long-1cm diameter-seed falls from the tree when the fruit turns purple. This fruit should be removed and the seed dried before sowing in beds. No further pre-treatment is needed. Germination begins in two to four weeks. Forest Department studies indicate that seed from Taita Hills plantations germinate faster than seed collected in Western Kenya.

Seed Sources

District Forest Officer, P O Box 460
Kakamega
District Forest Officer, Taita P O Box
Wundanyi



Ministry of Energy Agroforestry Project, P O
Box 23 Bukura
The Silviculturalist, Forest Department
(KARI), P O Box 74 Kikuyu
Ministry of Energy, Agroforestry Center, P O
Box 775 Kisii

MARKHAMIA HILDEBRANDTII

Local Names

Muu (Kik), Chyoo (Kam), Mungwani, Mogu (Mer).

Uses

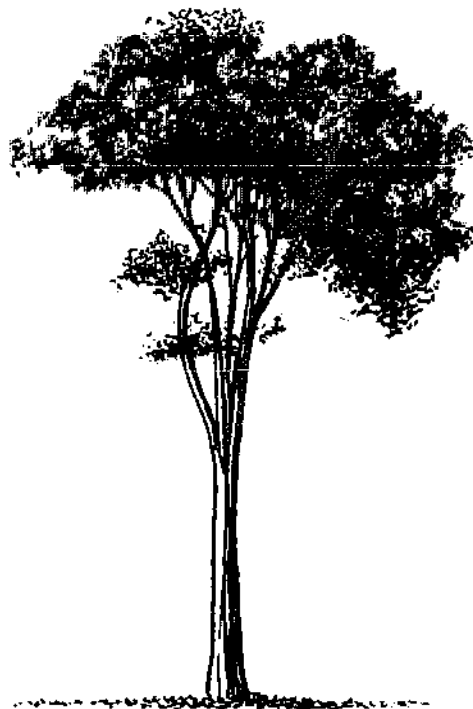
Markhamia hildebrandtii is a relatively fast growing tree very similar to *M. platycalyx*, but not nearly as widespread. It can associate with crops. The timber produced is of moderate weight, fairly easy to work, but not durable enough for outside use.

Preferred Climate Type

The natural range of this tree is the central highlands and the East Mau Escarpment. It prefers the Nairobi and Limuru climate types. (Zone II, 3-6; III, 3-6).

Seed Information

Very similar to *M. platycalyx* but the seed capsule is not as long. Follow the sowing,



planting and seed information given for *M. platycalyx*.

Seed Sources

District Forest Officer, P O Box 28 Nyeri
Ministry of Energy, Agroforestry Centre,
P O Box 23 Bukura
Ministry of Energy, Agroforestry Centre,
P O Box 30582 Nairobi
The Silviculturalist, Forest Department,
P O Box 74 Kikuyu



The Seedsman, Forest Department, P O
Box 30513 Nairobi

MARKHAMIA PLATYCALYX (Siala)

Local Names

Moo, Muu (Embu), Siala (Luo), Mabet (Mas), Lusiola (Luh), Sogdu (Som), Ekokwait (Turk).

Uses

Siala is perhaps the most widely used indigenous tree near Lake Victoria. It coppices well if cut properly and produces durable poles much liked by local carpenters. Timber from larger trees is also well liked. B.A.T. rates *M. platycalyx* as the best local tree for tobacco curing. Siala is often seen growing in cultivated fields where the leaves are used for mulch and the narrow crown limits shade impact. Its bright yellow flowers make it a good ornamental as well as providing a nectar source for honey bees.

Preferred Climate Type

The natural range of *M. platycalyx* is difficult to determine. It does very well in many climate types, the best perhaps being Kisumu/Murang'a and Migori. (Zone I, 2-5; II, 2-5; III, 2-5; IV, 2-4).



Seed Information

Siala produces seed prolifically in long, pod-like capsules. It is easy to collect at almost any time of the year. Fresh seed germinates



readily without pre-treatment. Storing seed is not recommended.

Seed Sources

As the tree is common in almost all its natural and planted range, we recommend personal collection. These sources can be used if you cannot find the tree.

District Forest Officer, P O Box 490
Kakamega

District Forest Officer, P O Box 376 Siaya
District Forest Officer, P O Box 66 Homa
Bay

District Forest Officer, P O Box 110 Meru
The Silviculturalist, Forest Department
(KARI) P O Box 74 Kikuyu

MELIA VOLKENSI

Local Names

Mukau (Kam), Baba (Som), Muramarui (Sam), bamba (Bor), Kirumbuta (Dig), Mukowe (Tav), Mpenda bure (Tai).

Uses

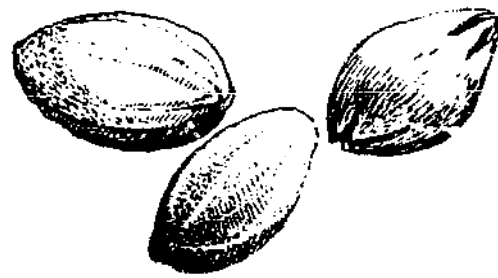
Melia volkensii is one of the most prized trees in the dry areas east of Mt Kenya. Its timber works well, is quite durable and strong and looks good. Being deciduous it is used for mulch. The large fruit is eaten by goats. Flowers are often visited by bees. Very often it is one of two or three species left in the cultivated areas by farmers in Machakos and lower Embu. Mukau is said to be fast-growing, especially from root suckers.

Preferred Climate Type

Primarily a tree of semi-arid climates, doing well in the Lake Victoria/Thika, Taveta/Isiolo types. (Zone IV, 1-3; V, 1-3; VI, 1-3).

Seed Information

Germination of the large-seeded Mukau has proved a difficult puzzle for many. It has been done, but consistent success has proven elusive. Probably the best method is to feed the fruit to goats, collect the hard seeds when they are dropped by the goats and sow them in a watchable part of the boma which can be



watered. With luck some may germinate and can then be transplanted. Be warned, this could take two years. A more reliable method of propagation is from root suckers. Find a living tree, go to a spot a metre or so from its base and dig a trench with a jembe, severing some roots. Leave the ends uncovered and wait. Soon leaves will grow on the severed ends. These can be cut away and transplanted. Take care not to expose the roots to the sun while removing them.

Seed Sources

EMI Forestry Project, c/o Provincial Forest Officer, P O Box 2 Embu
Mr Gideon Kinai, Chairman Kaewa Agroforestry Committee, c/o Mazingira Institute, P O Box 14550 Nairobi
District Forest Officer, P O Box 106 Kitui
The Forester, Jilore, P O Box 611 Malindi
District Forest Officer, P O Box 2 Machakos
The Forester, Gede, P O Box 201 Malindi

MORINGA STENOPETALA

Local Names

Murunda (Kam), Mau, Mawa (Som), Sutara (Bor).

Uses

A desert tree growing primarily in riverine settings in North Eastern Kenya. The tree is brittle with soft wood, which limits its usefulness. However, it has one important redeeming characteristic; an emulsion made from the seed can clarify muddy water. It is used this way by groups along the Tana River. (A

similar tree, from India, *Moringa oleifera* is grown along the coast. Mrongo [Swa] or Horse-radish Tree makes a good live fence, a powder from the roots is used as a spice and the seed yields an oil).

Preferred Climate Type

M. stenopetala is found in only three climate types; Wajir, Magadi/Garba Tula, Taveta/Isiolo, along rivers and areas with very high water tables. (Zone V, 1-2; VI, 1-2; VII, 1-2).

Seed Information

Fruits are triangular capsules about 40cm long. Seeds are large, about 5cm long and 2cm wide, also triangular with wings. Direct sowing in pots is appropriate and germination is high. The seedlings are easily damaged in transplanting. The seeds remain viable in storage for at least a year but are subject to insect attack if exposed.

Seed Sources

RAES, P O Box 18 Holo



Isiolo Forest Station P O Box 141 Isiolo
EMI Forestry Project, c/o Provincial Forest
Officer, P O Box 2 Embu.
NCKK Rhamu Service Centre, P O Box 19
Mandera

OCOTEA USAMBARENSIS (Camphorwood)

Local Names

Muithaiti (Kik), Muuru (Mer), Muzura (Embu), Mukongo (Tai), East African Camphorwood (Eng).

Uses

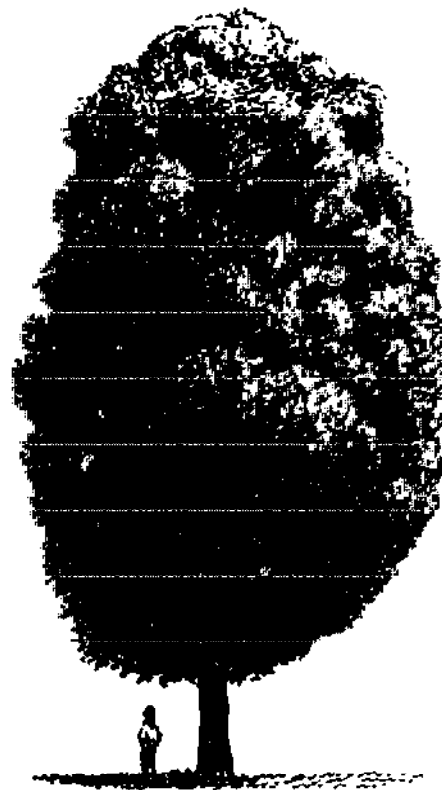
East African camphorwood is a large timber tree producing durable, attractive furniture and joinery wood, but it is not resistant to termites. It has a spreading crown so it is not a good one to plant among crops, but it does not interfere with crops otherwise. According to *Kenya Trees and Shrubs*, (Page 243) young trees will grow 6 feet (2 metres) per year.

Preferred Climate Type

Originally the dominant tree of the south east Mt Kenya forest and the Aberdares, *Ocotea* has been greatly exploited for its timber. It grows in the Kakamega, Kericho and Limuru climate types. (Zone I, 4-6; II, 4-6; III, 4-6).

Seed Information

Seed is produced plentifully by mature trees and is easily propagated. How long seed can



be stored without losing viability is not known, so using fresh seed is advised. Root suckers are readily produced from newly-felled trees. Simply cut roots some distance away from the base. Elephants are fond of young trees.

Seed Sources

District Forest Officer, P O Box 28 Nyeri
District Forest Officer, P O Box 546 Murang'a
The Forester-in-charge, Kinale Forest Station,
P O Box 56 Matathia

OLEA AFRICANA (Mutero, Wild Olive)

Local Names

Mutero Mutamaiyu (Kik), Muthata (Mer and & Kam), Ol-orien (Mas), Emitiet, Emitid (Nan), Jersa, Wera (Som), Larek, Lolion (Sam), Awireju, Euriepei (Turk), Jiemdet (Dor), Yemit (Elg), Ejars, Ejarisa (Bor), Brown or Wild Olive (Eng).

Uses

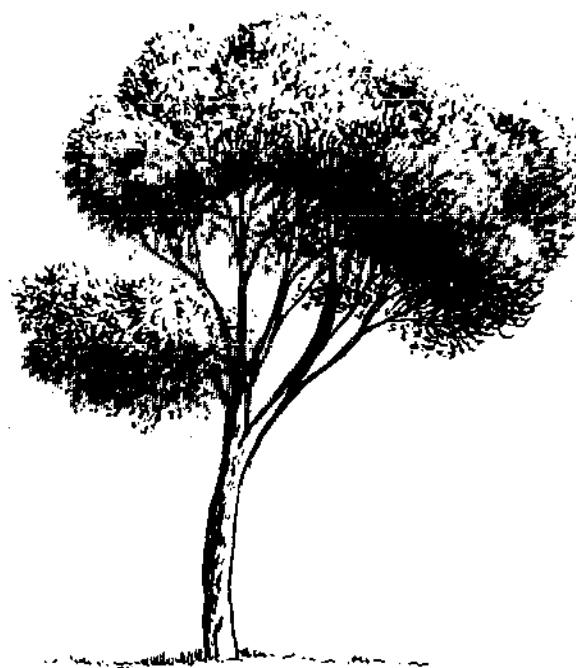
O. africana is the smallest of the three Oleas mentioned, but perhaps the most useful. Among the Kikuyu, Mutero is regarded as the best milk storage wood. Its high-energy fuelwood was used to power train engines before diesel oil was introduced. Although crooked and much branched, the timber is much prized for furniture, flooring and *run-gus*. Fruits are similar to the European olive and are edible. Its major drawback is its slow growth, making it not economical to plant many trees.

Preferred Climate Type

Very similar in range to *Juniperus procera*, the two are often found together in mixed forests. *O. africana* does well in the Eldoret and Rumuruti/ Narok climate types. It used to be common near Nyahururu and Rumuruti and good stands are still found in Narok District. (Zone II, 4-7; III, 4-7; IV, 4-6).

Seed Information

O. africana seed is shaped like a small rugby ball about 1cm long. The fruit pulp should be removed and dried before storing or transporting. Information on pre-sowing



treatment and viability are not available at present. The Forest Department nursery at Nyahururu collects wildings.



Seed Sources

District Forest Officer, P O Box 28 Nyeri
District Forest Officer, P O Box 19 Elburgon
District Forest Officer, P O Box 8 Nyahururu
District Forest Officer, P O Box 34 Narok
District Forest Officer, P O Box 41 Eldoret
The Forester, Konjoi, P O Box 28 Kapsabet
Mariosioni Forest Station, P O Box 19
Elburgon

OLEA HOCHSTETTERI (Mucarage, East African Olive)

Local Names

Masgat (Seb), Ol-loliondo (Mas), Mucarage (Kik), Loliondet, Kiptakeriondu (Elg), Masaieta (Dor), Musat (Mar), Loliandu (Sam), Muukuru (Mer). East African Olive (Eng).

Uses

Along with *O. africana*, Mucarage is a highly valued decorative wood having its light brown colour enriched with grey stripes. It does not nail well when dry. As floor boards, panelling, wood spokes and tool

handles, *O. Hochstetteri* is almost unexcelled. Again its limitation is slow growth, and it needs shade or surrounding trees for best growth.

Preferred Climate Type

Olea hochstetteri's range overlaps with *Olea africana*, but it prefers moister forests with more dense growth. Does well in the Limuru and Eldoret climate types. (Zone I, 4-7 II, 4-7; III, 4-7).

Seed Information

The seed is slightly larger than *Olea africana* and is found in an olive-like fruit about 2cm long which is not known to be edible. Information on pre-sowing treatment, etc, is not available. This tree is primarily reproduced as wildings. Around Nyahururu these are collected from the forest in August and September to be transplanted the following April.



Seed Sources

The Silviculturalist, Forest Department,



P O Box 74 Kikuyu
District Forest Officer, P O Box 19 Elburgon
District Forest Officer, P O Box 8 Nyahururu
District Forest Officer, P O Box 28 Nyeri
Mariosioni Forest Station, P O Box 19
Elburgon
The Forester-in-charge, Kinale Forest
Station, P O Box 56 Matathia
District Forest Officer, P O Box 41 Eldoret

OLEA WELWITSCHII (Elgon Olive)

Local Names

Mucarage (Kik), Muukuru, Muriuutui (Mer), Ol-giloni (Mas), Murguiwet (Nan), Mutukuya (Luh), Muruuguyet (Pok), Buinondet (Elg).

Uses

Often called the Elgon Olive or Elgon Teak, *Olea welwitschii* is the largest E. African Olive. It has a straight, clear bole to 80 feet in mature trees, with a light crown. It does not appear to interfere with crops. The timber is heavy, strong, durable and termite-resistant. Its hardness makes sawing difficult but it is very useful for heavy construction purposes. Growth, as expected, is very slow.

Preferred Climate Type

Limited in range to the wetter highland forests of western Kenya, especially Mt Elgon; Kakamega, Kericho and Limuru climate types. (Zone I 3-7; II 4-7).



Seed Information

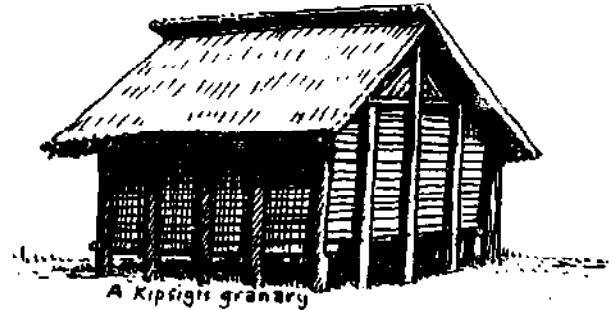
Seeds are about the same sizes as *Olea africana*, treatment and storage information again being unavailable. This tree has been planted



from seed and further information may be obtained through the seed sources listed below.

Seed Sources

District Forest Officer, P O Box 506 Bungoma
 District Forest Officer, P O Box 99 Kitale
 District Forest Officer, Nandi, P O Box 28
 Kapsabet
 The Silviculturalist, Forest Department, P O
 Box 74 Kikuyu



A Kipsigis granary

PARKINSONIA ACULEATA

Native Range

A native of the drier regions of North and South America. It is a short, fast-growing, thorny tree, already well established in drier places in Kenya.

Uses

Parkinsonia aculeata has many uses, including ornamental living fences, but is often referred to as the *takataka* tree in Kenya. It grows quickly, producing fodder and fuelwood. It does not require good soil, making it a good tree for planting in gullies and other eroded sites. It also recovers vigorously from coppicing or lopping branches. It is very drought-tolerant, merely dropping the tiny leaflets from the long, flattened leaf stems when rains delay.

Preferred Climate Type

Very drought-hardy, parkinsonia will grow well even in drier parts of the Wajir climate type. In areas moister than Taveta/Isiolo its potential for weediness is too great. (Zone V, 1-3; VI, 1-3; VII, 1-3).

Seed Information

The very hard, pointed seed germinates readily after nicking or soaking for 3 or 4 days. They grow quickly needing only 3 months in a nursery. Direct sowing into pots, 2 seeds per pot, eliminates the need for a seed bed and works well. Care should be taken not to over-water as damping off (a fungus disease which kills seedlings) is a problem. Seeds remain viable in storage for long periods, similar to the acacia.



Seed Sources

District Forest Officer, P O Box 48 Wajir
 District Forest Officer, P O Box 89 Garissa
 District Forest Officer, South Nyanza P O
 Box 66 Homa Bay
 NCKK Centre Rhamu Service Centre, P O
 Box 19 Mandera
 UNESCO, Attention: Hugh Lamprey, IPAL
 P O Box 30592 Nairobi.

PILIOSTIGMA THONGINGII

Local Names

Mulema (Kam), Msaponi (Swa), Lecholo (Sam), Engomamur (Turk), Abairtubata (Bor), Mukura (Mbeere).

Uses

P. thongingii is a relatively short tree with hard, termite-resistant wood which makes good posts. The tree is often called camel's foot, because of its large leaves which make fine mulch as the tree fixes nitrogen. It is a good looking tree, often used ornamentally and it produces pods, the pulp of which is edible. The pod also provides fodder.

Preferred Climate Type

Though fairly widespread these days, much of this may be due to its valuable ornamental. It does well in the Lake Victoria/Thika climate type. (Zone II, 2-4; III, 2-4; IV, 2-4; V, 2-4)



Seed Information

The seed is about the size of a large pea or a pigeon pea. It is quite hard to extract from the pod making the collection of large quantities difficult. Insect attack is frequent.



Store in a cool, dry, insect free place. Viability is good even up to years storage; beyond that it is not known. Soak the seed 24 hours before sowing. Germination is normally above 50 per cent. Nursery time varies but should be around 4 months.

Seed Sources

Siakago Primary School, Agroforestry Committee c/o Mazingira Institute, P O Box 14550 Nairobi

EMI Forestry Project, c/o Provincial Forest Officer, P O Box 2 Embu

District Forest Officer, P O Box 106 Kitui
Ministry of Energy Agroforestry Centre, c/o Better Living Institute, P O Box 683 Kitui

PODOCARPUS GRACILIOR (Podo)

Local Names

Mubiribiri (Meru), Muthengera (Kik), Muvengea (Kam), Ol-pirripirri (Mas), Saptet (Kipsigis), Piripirindi (Sam), Lotimat (Turk), Marabet (Dor), Bener, Benet (Elg), Podo, East African Yellow-wood (Eng).

Uses

Both *P. gracilior* and *P. milanjanus* are regarded as having the best quality softwoods in East Africa. Furniture and other joinery work, boxes, bakery boards, handi-

craft and plywood can all be made from podo. Boards do have a tendency to warp if not properly dried. The tree has dense shade and is not regarded as compatible with crops. *P. gracilior* leaves are smaller than *P. milanjanus*. Growth rates for both are slower than cypress imports but faster than for many hardwoods.

Preferred Climate Type

A tree of drier highland forests, similar in range to *Juniperus procera*. It prefers the

Nairobi and Eldoret climate types. (Zone I, 4-7; II, 4-7; III, 4-6; and along rivers in IV, VI, 4-6).

Seed Information

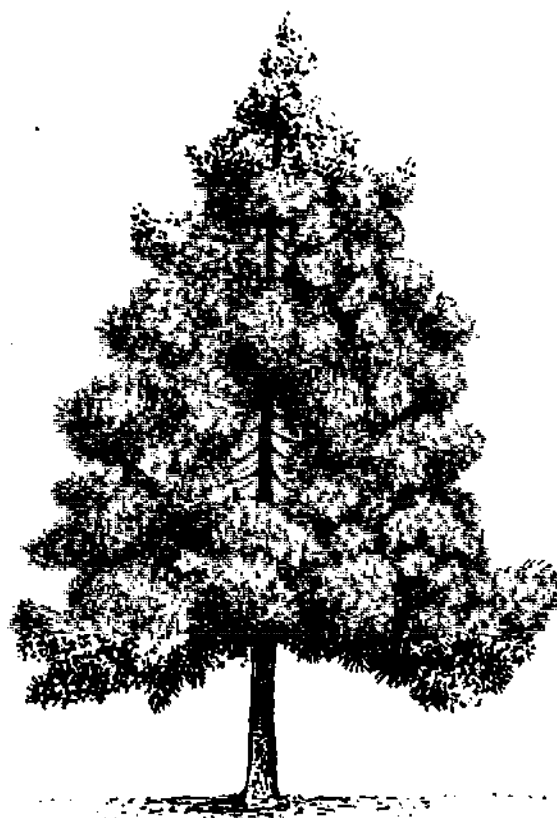
Seeds are spherical, about 1.5cm in diameter when ripe. Monkeys are attracted to the trees when the seeds ripen. To speed germination before sowing, the hard woody seed-coat should be cracked. No other pre-treatment is required. Seed stores well if kept cool and dry. Viability is at least two years.

Seed Sources

District Forest Officer, P O Box 8 Nyahururu
District Forest Officer, P O Box 19 Elburgon
The Seedsman, Forest Department Headquarters, P O Box 30513 Nairobi



Ministry of Energy, Agroforestry Centre,
Ngong, P O Box 30582 Nairobi
District Forest Officer, P O Box 28 Nyeri



Ministry of Energy, Agroforestry Centre, P O
Box 29 Nyeri
District Forest Officer, P O Box 2 Embu
The Silviculturalist, P O Box 74 Kikuyu
District Forest Officer, P O Box 25 Maralal

PODOCARPUS MILANJIANUS (Podo)

Local Names

Muthengera (Kik); Mubiribiri (Mer), Okikacha (Luo), Eugoile, Ol-chani (Mas), Saptet (Nan), Sosaitu, Sorti (Elg), Chemisdu, Maisa (Tai), Podo, East African Yellow-wood (Eng).

Uses

Similar to *P. gracilior* in most respects. It grows at elevations normally above the range of cultivation. The timber is slightly darker.

Preferred Climate Type

A tree of moist highland forest above 2000 metres in the Kericho, Limuru and Mountain climate types. (Zone I, 5-8; II, 5-7).

Seed Information

The hard, woody seed shell is slightly smaller



than *P. gracilior*, normally seen in pairs on the tree. Cracking is the best method to speed germination for small amounts of seed. Growth rate in the nursery is slow, requiring up to a year before transplanting.

Seed Sources

District Forest Officer, P O Box 28 Nyeri

District Forest Officer, P O Box 110 Meru
District Forest Officer, P O Box 19 Elburgon
District Forest Officer, Trans Nzoia, P O
Box 99 Kitale
The Silviculturalist, Forest Department P O
Box 74 Kikuyu

POLYSCIAS KIKUYUENSIS (Mutati)

Local Names

Mutati (Kik), Mukurukuru (Mer), Mukenya (Tai), Olyalilingi (Mas), Saiyet (Nan), Aounet (Kip), Kwaluk (Seb), Aul (Kamas), Muachet (Dor), Aoun (Mar and Elg).

Uses

Mutati is a common wet highland tree, growing to 25 metres, with self-pruning branches and an open crown. It grows faster than most indigenous highland trees. Leaf fall provides good mulch, soil under the tree being quite fertile. Its spreading, open crown means little competition with crops for light, making it potentially an excellent agroforestry species. The timber is white and light-weight, not durable, but valued for food containers, boxes, veneers and plywood. The wood is not a good fuel, though it can be used as such.

Preferred Climate Type

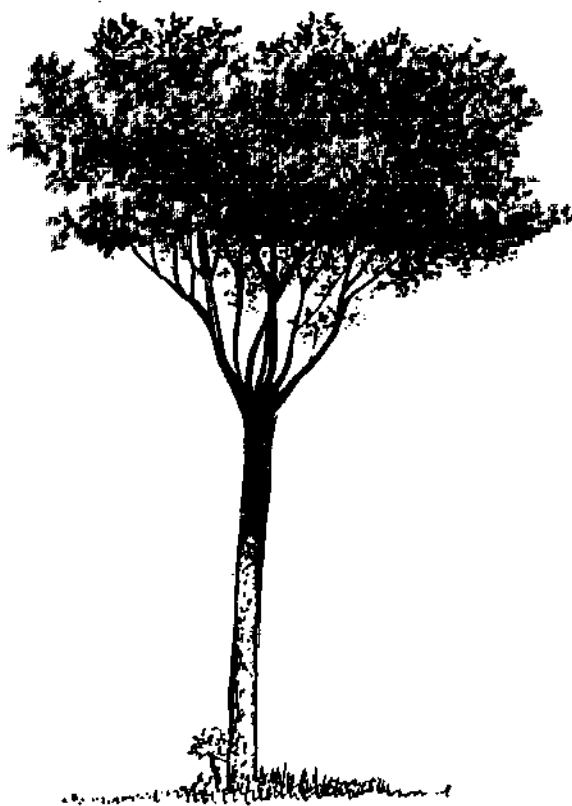
Very similar to *Podocarpus milanjianus*, it thrives in Limuru, and Mountain climate types. (Zone I, 5-7; II, 5-7).

Seed Information

Once again this tree is more commonly reproduced in the nursery from wildings rather than seed. The seeds are small and light-weight,

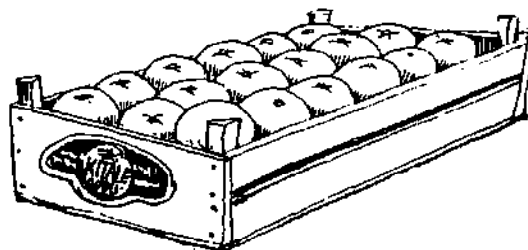


requiring no pre-treatment. It needs about six months in the nursery if grown from seed. Length of seed viability is not known.



Seed Sources

District Forest Officer, P O Box 28 Nyeri
District Forest Officer, P O Box 8 Nyahururu
District Forest Officer, Nyandarua, P O Box
289 North Kinangop
District Forest Officer, P O Box 775 Kisii
District Forest Officer, P O Box 41 Eldoret
The Forester, Konhoi, P O Box 28 Kapsabet.



PROSOPIS CHILENSIS

Native Range

Indigenous to South America, *P. chilensis* has now been introduced widely in Africa.

Uses

P. chilensis is not as fast-growing as some other exotics, but does quite well in Kenya. The wood makes good posts, durable and strong, and also provides good fuel. Pods are sweet and make good animal feed, though it takes time to introduce native stock to the plant. Foliage is also a good feed. It is very drought-tolerant. In good conditions it can become a weed problem.

Preferred Climate Type

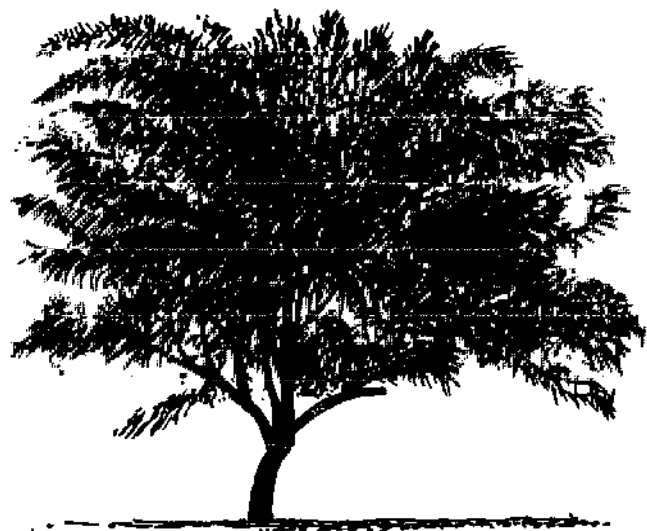
P. chilensis is growing well in Baringo District and Rhamu without irrigation. The best climate types are Wajir and Magadi/Garba Tula (Zone V, 1-3; VI, 1-3; VII, 1-2.)

Seed Information

Prosopis trees in general produce many pods, making seed easy to collect, the trick being to



extract them from the pods. *P. chilensis* pods when ripe, are a light straw yellow, containing up to 25 seeds each. The seeds, once extracted,



are small, perhaps 20,000 per kilogram. These germinate quickly after nicking and can also be soaked 24 hours for pre-treatment. They are subject to damping off. Root pruning is needed frequently with open-ended pots. Seeds store well both in the pod and when extracted. Insect damage is less frequent than in indigenous species.

Seed Sources

East Pokot Agricultural Project, Kositei
Catholic Mission Nginyang via Nakuru
P O Marigat
Mr Murray Roberts, P O Box 1051 Nakuru
NCKK Rhamu Service Centre, P O Box 19
Mandera

PROSOPIS JULIFLORA

Native Range

Often called *mesquite* in its homeland of Southwestern U.S. and Mexico, *P. juliflora* is widely planted in Kenya from the coast to Turkana.

Uses

First and foremost this tree is a firewood crop. The wood is hard and heavy and burns slowly with great heat and little smoke. The charcoal



produced from it also has excellent properties. Other uses include bee forage for honey, durable posts, fodder for livestock and even human food from the pods. Foliage is not as palatable as some species, so is usually left alone by goats until very dry. Thorny natural varieties have potential as living fences. The tree coppices well. It grows faster than *P. chilensis* and has the same potential weediness, so should

not be grown in cultivated areas. *P. juliflora* is very drought-hardy.

Preferred Climate Type

Because of *P. juliflora's* potential for weediness it is best to plant only in dry climates like Wajir, Magadi/Garba Tula, Taveta/Isiolo and perhaps Kajiado types. It is more adaptable to cooler areas than other desert species. It thrives without irrigation in Rhamu where the average rainfall is less than 250mm annually.

Seed Information

Very similar to *P. chilensis*, except pods tend to be more brittle, sweeter and a shade darker. Seeds are difficult to extract from pods. Pre-treatment, sowing and problems are very similar to *P. chilensis*.

Seed Sources

Baobab Farms Limited, P O Box 90202 Mombasa (Have both thorny and thornless



varieties.)

Ministry of Energy, Kitui Agroforestry Centre, c/o Better Living Institute, P O Box 683 Kitui

NCKK Rhamu Service Centre, P O Box 19 Manderu

Ministry of Energy, Agroforestry Centre, Ngong, P O Box 30582 Nairobi.

PRUNUS AFRICANUM (*Pygeum africanum*)

Local Names

Muri (Kik), Mweria (Mer), Mwiritisa (Luh), Mutimailu (Kam), Twendet (Nan), Tenduet (Dor, Elg, Kip), Oromoti (Seb), Ol-koijuk (Mas), Kiburraurra (Kis).

Uses

Prunus africanum is a tall forest tree producing strong, deep-red wood for heavy purposes like railway sleepers, bridges, lorry bodies, door frames and even furniture. It is easy to saw and plane. As firewood it is of the best quality. The tree grows at a moderate rate and can grow in open areas. Its compatibility with crops has not been tested.

Preferred Climate Type

Prunus africanum is another highland forest tree, but it will grow in lower areas than some. It is a common tree in forests near Kakamega and Nyahururu. It prefers the



Kakamega, Kericho and Limuru climate types (Zone I, 3-8; II, 4-7; III, 4-7).



Seed Information

Seeds are small and oval, being found as the stone of a fruit slightly over 1cm in diameter. Most often this tree is collected as wildings from established stands, though it can be

reproduced from seed in a nursery as well. Seeding time around Nyahururu is August. Viability data is not known.

Seed Sources

District Forest Officer, P O Box 8
Nyahururu

District Forest Officer, P O Box 19 Elburgon
District Forest Officer Nandi, P O Box 28
Kapsabet

The Forester Taita-Taveta Forest Station,
P O Wundanyi

SALVADORA PERSICA (Toothbrush Tree)

Local Names

Mswaki (Swa), Muezu-moyo (Gir), Ade (Som), Ethokon (Turk), Huda (Bor), Mukayau (Kam), Toothbrush Tree (Eng).

Uses

Everywhere it is found *S. persica* is used as a toothbrush. Small twigs about 5 mm in diameter are cut for brushing the teeth and gums. A study done in co-operation with the Kenya National Herbarium showed that the bark contains an antibiotic which suppressed bacteria growth and formation of plaque in the mouth. The tree is one of the few remaining evergreen even in the driest part of north eastern Kenya. Because of this it is valued for fodder when other plants are unavailable for camels and goats. Everywhere it is a small tree or bush, growing to six metres.

Preferred Climate Type

The toothbrush tree grows over a wide area but does best in the Wajir and Magadi/



Seed Information

Fruits are small and pea-shaped, containing one seed. Little is known about the growing of this species.

Seed Sources

District Forest Officer, P O Box 89 Garissa
District Forest Officer, P O Box 48 Wajir



Garba Tula climate type. (Zone IV, 1-3; V, 1-3; VI, 1-3; VII, 1-2).



ESBANIA SESBAN

Local Names

Mwathia (Kik), Munyongo (Kam), Osawo
Mwathia (Luo), Mwathia (Mas),
Mwathia (Nan), Labiyero (Luh), Nati-
a (Elg), Daisa (Bor).

Uses

Sesban is one of a few Kenyan trees ready being used as an agroforestry tree, especially in Western Kenya. It is known to be a good coffee shade tree and soil improver. Wherever it grows it is left standing, even in fields of maize or sugar-cane. It is also a soil fertilizer and grows well in swampy sites. Though soft, the wood provides firewood. At a fast growth rate and quick return of fuel make it a very interesting tree for planned agroforestry strategies. Nearly all currently growing trees are naturally distributed.



Preferred Climate Type

Grows in the mid-lands of Kenya especially the Migori and Kisumu/Murang'a climate types, though its range is considerably wider. Plants have been found near Ngong, the shores of Lake Victoria and Baringo, the Coast and on Yatta Plateau. (Zone I,



3-4; II, 1-4; III, 1-5; IV, 1-4 and along streams).

Seed Information

The tree seeds abundantly, the long cylindrical pods containing many small, green, black-speckled seeds about 3 mm long, also cylindrical. Damaged seed is often found in the pod, necessitating sorting and cleaning. When kept dry and cool, the seed has long viability. Because of its quick germination and fast growth it is best to plant *Sesbania sesban* directly in the field rather than in a nursery.

Seed Sources

Mr Erasto Ajwang, P O Box 50 Oyugis
Mr Abner Mango Opot, P O Box 194 Yala

PATHODEA NILOTICA (Nandi Flame)

Local Names

Mwathia (Luo), Sebetaiyet (Nan), Kibobai (Swa), Mutsurio (Luh), Nandi Flame.

Uses

This is, perhaps the most common indigenous ornamental tree in Kenya. The blazing orange-red flowers and stately full, dark green crown make it ideal for avenue lining and other city uses. Unfortunately its soft

light wood is not very durable or useful. It can grow near crops, but the dense crown makes intercropping not feasible. As a mulch it is useful though not the best.

Preferred Climate Type

Original range was Western Kenya and into Uganda, but it now has been planted widely. Grows best in the Nairobi, Limuru, Kakamega and Kericho climate types. (Zone I, 3-6; II, 1-6; III, 1-6).

Seed Information

Seeds are thin and waferlike, with almost transparent wings about 2cm diameter. The tree seeds profusely and seed dispersal is almost continuous, much like the closely related *Markhamia*. Seeds require no pre-treatment. Viability is relatively short so fresh seed should be used. Four to five months in the nursery is sufficient.



Seed Source

The Seedsman, Forest Department Headquarters, P O Box 30513 Nairobi
ICMI Forestry Project, c/o Provincial



Forest Officer, P O Box 2 Embu
District Forest Officer, P O Box 28 Nyeri
Ministry of Energy Agroforestry Centre,
Ngong, P O Box 30582 Nairobi

AMARINDUS INDICA (Tamarind)

Local Names

Muthithi (Mer), Kithamula (Kam), Chua Luo), Ol-masamburai (Mas), Mkwaju (Swa), Hamar (Som), Epeduru (Turk). Roka (Bor), Oran (Pok), Muzumure (Tav), Tamarind (Eng).

Uses

A slow-growing but very valuable tree of the drier regions. Tamarind wood is hard, heavy, dark brown, hard to work but easy to polish. It is used for furniture, pestles, mortars, carts and boat building. The fruit is a pod with delicious, tart pulp which is high in vitamin C. This pulp is often mixed with uji or sorghum ugali, both for flavour and digestibility. In addition tamarind provides good shade, mulch, medicine (laxative) and excellent charcoal.

Preferred Climate Type

In very dry areas, such as Rhamu in north-west Kenya, tamarind is a riverine tree. In the Lake Victoria/Thika climate type, it is much more widespread. It also does well in the



Kajiado and Taveta/Isiolo climate types. (Zone III, 1-3; IV, 1-3; V, 1-3; VI, 1-3; VII, 1-2).

Seed Information

Tamarind has a large seed, about 3,000 per kilogram, which germinates quickly at a rate

above 90% when the seed coat is nicked. They store well, remaining viable for more than two years if protected from insect attack. Initial growth rates are very fast, the tree needing only 12 weeks in the nursery.



Seed Sources

East Pokot Agricultural Project, Kositei
Catholic Mission, Nyinyang via Nakuru,

P O Box Marigat
EMI Forestry Project, c/o Provincial
Forest Officer, P O Box 2 Embu
District Forest Officer, Baringo,
P.O. Box 28 Eldama Ravine
District Forest Officer, P O Box 106 Kitui
District Forester Officer, P O Box 24, Kilifi.
The Chief, Miambani Location, c/o District
Forest Officer P O Box 106 Kitui
RAES, Turkana, P O Box 39 Lodwar

District Forest Officer, P O Box 42
Kapenguria
District Forest Officer, P O Box 2 Embu

TECLEA NOBILIS

Local Names

Munderendu (Kik), Datsi, Achacho (Luo),
Ol-gelai (Mas), Keriondet (Nan), Keryot
(Kip), Mutaro (Luh), L'gilai (Sam), Koriot
(Dor).

Uses

The yellow-white, moderately heavy wood of *Teclea nobilis* is the most common spear-shaft and walking-stick wood in areas where it grows. The timber turns well, but nails poorly and is not very durable in the ground. The tree grows quite tall, at a moderate to slow rate. It is said to be compatible with crops, but experience is quite limited. The roots are boiled with honey to make medicine.

Preferred Climate Type

Teclea is often found in mixed forests with *Olea africana*, though it does not extend into areas quite as dry. It is common in the Ngong/Karen area near Nairobi and in Nyahururu. Climate types include Nairobi, Eldoret, Limuru, Kericho and even Mountain. (Zone I, 4-7; II 4-7; III 4-7).

Seed Information

Ripe fruits are red, about 1cm long, containing a single seed. Other information not available at this time.



Seed Sources

District Forest Officer, P O Box 460 Kakamega
Laikipia Forest Officer, P O Box 8 Nyahururu
District Forest Officer, P O Box 28 Nyeri



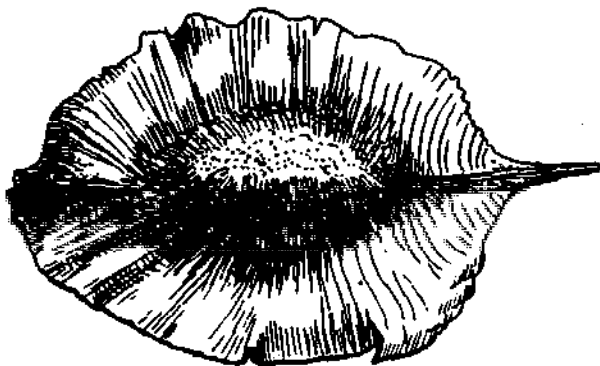
TERMINALIA BROWNII

Local Names

Muuku (Kam), Baresa (Bor), Hareri Biiris (Som), Epiyei (Turk), Koloswet (Kamas), Manera, Onera (Luo), Mbarao (Swa), Shiraha (Luh), Kipkaioywa (Pok), Moissot (Kip).

Uses

Terminalia as a genus is a group of highly useful trees normally growing in dry areas. *T. brownii* is perhaps the most common. Its wood is favoured for mortars and pestles among the Kamba. Being termite-resistant it is often found as support poles for houses and grain storage sheds. Despite its rather dense shade, crops do well under its canopy, indicating an improved microclimate and soil improvement from leaf litter. A yellow dye comes from the roots. An extract from the leaves is used to treat pink-eye in livestock and a medicine from the bark is used in local treatments of hepatitis. A highly useful tree, its major drawback is slow growth unless irrigated.



Preferred Climate Type

Muuku prefers deep sandy soils in semi-arid locations like Machakos District or the shores of Lake Victoria. The Lake Victoria/Thika, Kajiado and Taveta/Isiolo climate types are best. (Zone III, 1-3; IV, 1-3; V, 1-3; VI, 1-3).

Seed Information

T. brownii appears to seed almost continuously, the seed being two-winged, about 3cm long and 2cm wide, red to purple in colour. Germination is difficult. Experiments are now underway on germination tech-

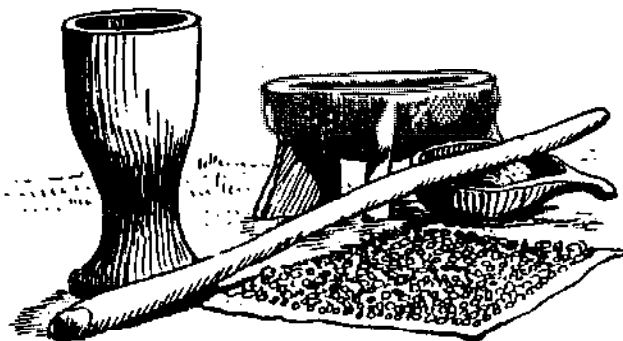


nique. At this point it appears that burning is the best method, but the exact timing has yet to be determined. The seed keeps indefinitely. Care should be taken to inspect all seed for insect damage.

Seed Sources

EMI Forestry Project, c/o Provincial
Forest Officer, P O Box 2 Embu
District Forest Officer, P O Box 66
Homa Bay

District Forest Officer, P O Box 376 Siaya
District Forest Officer, P O Box 106 Kitui
Mutito Forest Station, P O Box 106 Kitui
Mr Gideon Kinai, Kaewa Agroforestry Pro-
ject, c/o Mazingira Institute, P O Box
14550 Nairobi



TERMINALIA PRUNIOIDES

Local Names

Hareri (Som), Mutoo, Mutau (Kam), Mwangati (Swa), Mwangi (Gir), Musangano (Tai).

Uses

Very similar to *T. brownii* though medicinal uses are not known. The timber is harder, heavier and probably more durable than *T. brownii*. It is even durable in salt water. *T. prunioides* grows quite tall, having horizontal, table-like branches giving it an interesting appearance. Its crown is of moderate density.

Preferred Climate Type

Found in drier areas than *T. brownii* though ranges overlap. It grows in Kitui District and in interior coastal forests, preferring the Taveta/Isiolo climate type. (Zone IV, 1-2; V, 1-2; VI, 1-2).



Seed Information

Seed are slightly smaller than *T. brownii* being 2.5cm long and 2cm wide, two-winged



and light-red to red-purple in colour. Germination again is difficult, being similar to *T. brownii*.

Seed Sources

District Forest Officer, P O Box 106 Kitui
EMI Forestry Project, c/o Provincial
Forest Officer, P O Box 2 Embu
Ministry of Energy, Agroforestry Centre,
c/o Better Living Institute P O Box 683
Kitui

District Forest Officer Wajir c/o Provin-
cial Forest Officer, P O Box 89 Garissa

TERMINALIA SPINOSA

Local Names

Hareri (Sam), Epata (Turk), Horobbo (Bor), Mwangati (Swa), Mwangi (Gir), Mutula (Kam).

Uses

Terminalia spinosa, as the name implies, is a spiny desert tree, growing to 15 metres. It is deciduous. Among the Somalis, Hareri is regarded as the best wood for bomas, mova-

ble houses and semi-permanent structures. Its hard, heavy, dark-brown wood is almost termite-proof and very durable. As the leaves are not normally consumed by goats, its potential as a living fence is great. It grows in dry bush country on rocky sites.

Preferred Climate Type

It grows in desert areas and dry Coastal forests. It can also be found in lower Meru

District. Magadi/Garba Tula and Taveta/I-siolo climate types are perhaps best (Zone IV, 1-2; V, 1-2; VI, 1-2; VII, 1-2).

Seed Information

Smallest of the *Terminalia* listed here, the seeds are about 2cm long and 1.5cm wide and straw-coloured. Germination, although difficult, seems to be better than in the others. Seeding times are not available.

Seed Sources

EMI Forestry Project, c/o Provincial



Forest Officer, P O Box 2 Embu
Ministry of Energy, Agroforestry Centre,
Mtwapa, P O Box 90290 Mombasa

VITEX KENIENSIS (Meru Oak)

Local Names

Muhuru (Kik), Muuru (Meru), Muhutu (Luh), Meru Oak (Eng).

Uses

Probably one of the most widely known trees in Kenya, Meru Oak is now considered an endangered species despite its relatively fast growth and economic importance. Timber is lightweight and brown in colour with a wavy grain. It works well with uses similar to podo. The fruit is edible. It can be used as a windbreak and can grow to a large, clear-boled tree.

Preferred Climate Type

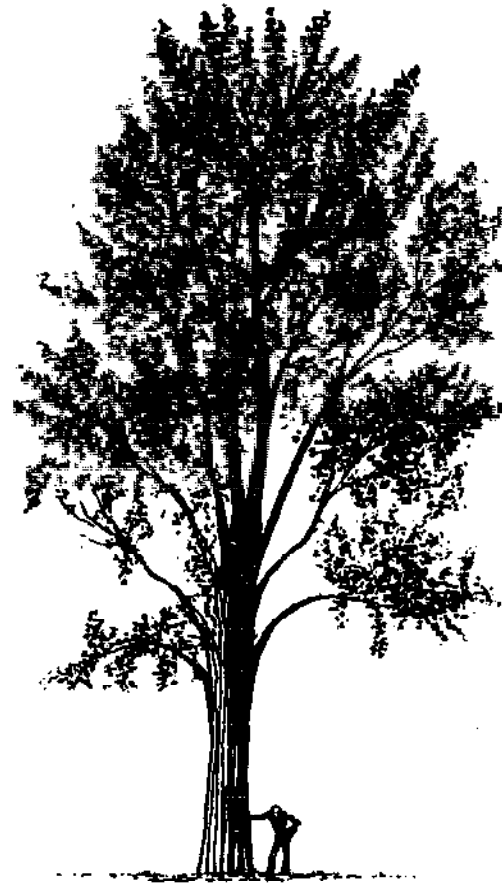
Meru Oak has a restricted natural range mostly the North-east slopes of Mt Kenya in the Kakamega, Kericho and Migori climate types (Zone I, 3-5; II, 3-5).

Seed Information

Fruits drop from the tree when ripe and can be collected from the ground. The seed is



about 1 cm in diameter, somewhat oblong. They are sown in seed beds, without pre-treatment. Seeds store reasonably well if



kept cool and dry, though the duration of their viability is unknown.

Seed Sources

The Forester, Kiandongoro Forest Station,
P O Box 28, Nyeri
Ministry of Energy, Agroforestry Centre,
c/o Wambugu FTC, P O Box 899 Nyeri

The Silviculturalist, Forest Department,
P O Box 74 Kikuyu
The Seedsman, Forest Department Head-

quarters, P O Box 30513 Nairobi
Ministry of Energy, Agroforestry Centre,
Ngong, P O Box 30582 Nairobi

WARBURGIA UGANDENSIS (Greenheart)

Local Names

Muthiga (Kik), Muitha (Luo), Osokonai (Mas), Soget (Nan), Omenyakige (Kis) Marut (Dor), Moissot (Kip), Musunui (Mer), Sorget (Kamas), East African Greenheart (Eng)

Uses

The wood of the East African Green-heart turns from green to brown after felling. It works and polishes well but it is not durable. As firewood it burns well with a strong incense smell. The bark is often used as a medicine for stomach problems. Leaves and seed taste like pili-pili and are sometimes used as a chilli substitute in curries. Its resin acts as a glue to fix tool handles. It grows to 30 metres at a slow pace.

Preferred Climate Type

This tree grows well in Nairobi and in the Kakamega Forest. It prefers the Kakamega, Limuru and Nairobi climate types. (Zone I, 3-6; II, 3-6; III, 3-6).

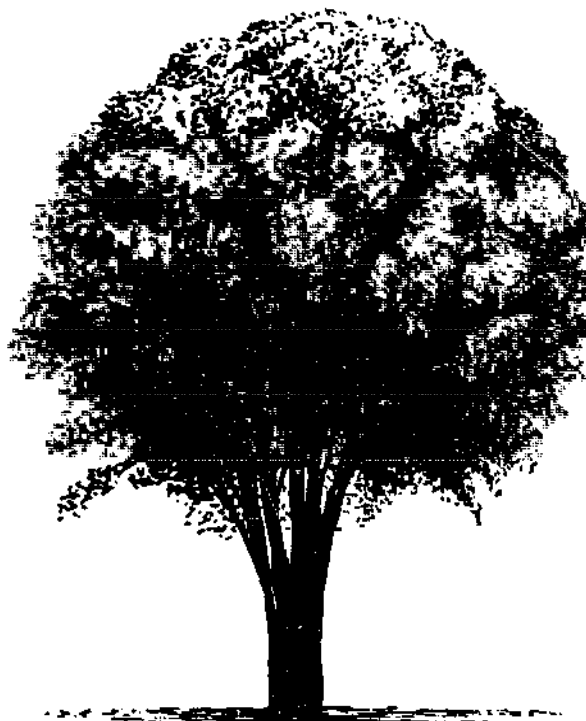


Seed Information

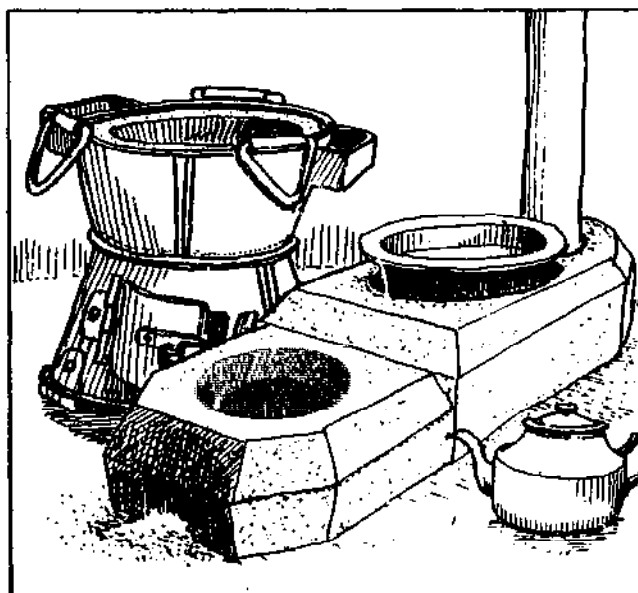
Seeds are hard to collect but can be found at Kieni West, Nyeri in August Information on growing from seed is not available *Warburgia* is known to reproduce from cuttings.

Seed Sources

The Forester RAES Nyeri P O Box 28 Nyeri
The Silviculturalist, Forest Department,
P O Box 74 Kikuyu



District Forest Officer, P O Box 460 Kakamega
The Seedsman, Forest Department Head-
quarters, P O Box 30513 Nairobi



Contemporary wood-fuelsaving cooking stoves.

ZIZYPHUS MAURITIANA

Local Names

Mkunazi (Swa), Kurkurrah (Bor), Geb, Gub (Som), Ekalali (Turk), Olongo (Luo), Tildwo Kamas), Tolumwo (Pok).

Uses

A small, very drought-resistant tree, geb is regarded as fast-growing for dry sites. The wood is hard and heavy, used for beds and dhow ribs at the coast, but only small sizes can be cut. Fruits are edible and quite refreshing. In dry sites, *Zizyphus mauritiana* makes an excellent living fence, armed with very sharp, light brown thorns. It coppices well and provides fodder, and tannin can be obtained from the bark.

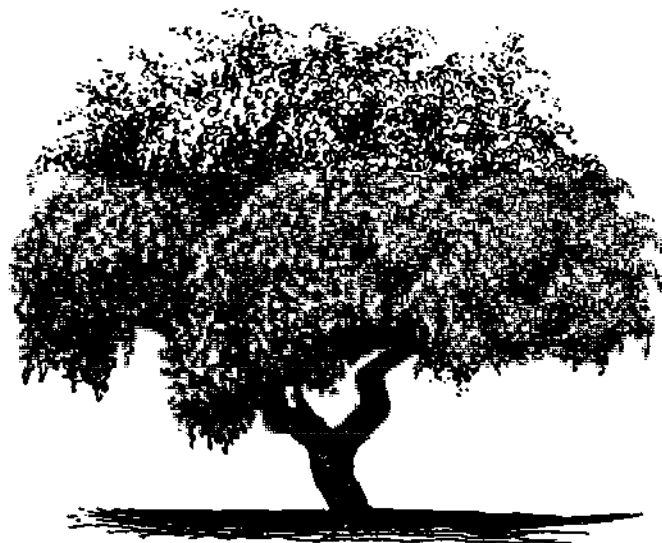
Preferred Climate Type

Taveta/Isiolo, Magadi/Garba Tula and Wajir climate types are preferred by this tree. In the driest areas it does best in riverine settings. (Zone V, 1-2; VI, 1-2; VII, 1-2)



Seed Information

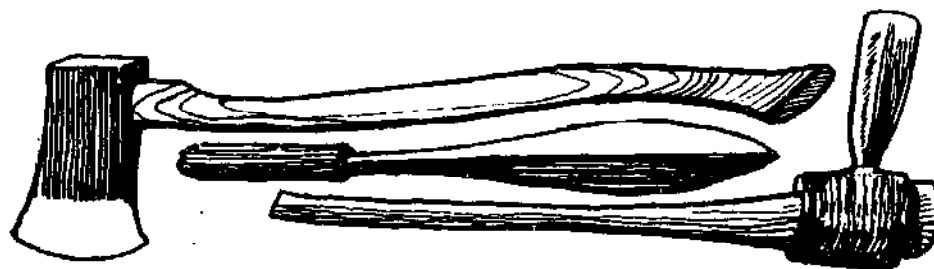
Fruits are yellow to yellow-brown when



ripe, containing one hard, round stone less than 1 cm in diameter. Best results are obtained from seed which is removed from the stone just prior to sowing. Viability drops slowly in storage, which should not last more than one year. Germination percentages are often low.

Seed Sources

East Pokot Agricultural Project, Kositei
Catholic Mission, Nginyang via Nakuru
P O Box Marigat
District Forest Officer, P O Box Mandera
District Forest Officer, P O Box Turkana
District Forest Officer, Baringo, P O Box 28
Eldama Ravine





Fruit Trees

Fruit trees are regarded as special trees because of their importance as a source of food and cash. Many fruit tree species have been genetically improved for better fruit quality and higher yield. But they often require more inputs, like irrigation, fertilizer and disease control. In addition managing a fruit orchard involves more labour than looking after other trees. The goal of this section is not to give complete information about fruit trees—much of this is available from other sources—but rather to provide a general guide as to where each tree can be profitably grown and where there may be seedlings or seed sources.

Most horticulturalists do not recommend the growing of fruit trees from seed; such trees are less likely to produce the same good quality fruit as the mother tree. Much work has been done on the development of varieties which require grafting or budding on the selected rootstock which is grown from seed. For grafting and budding, mother trees are chosen for disease resistance and for sweetness, quantity and quality of their fruit. This is especially true of citrus fruit, avocado and macadamia nut.

The main sources for fruit tree seedlings are horticultural nurseries which are found in each province. These are listed by province at the end of this section. Below the addresses is the list of species available, including many others not detailed in the text.

There are a number of indigenous trees with edible fruits which should be considered as well. Some have been mentioned under multi-purpose tree species. In the last part of this chapter, others are listed with local names, along with a few additional exotic fruit trees.

CITRUS FRUITS

Citrus fruits originally came from India and China and are now perhaps the most widely planted fruit trees in the world. All the

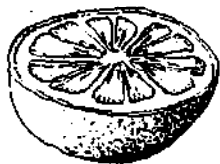
varieties are from the genera *Citrus*, *Poncinsis* and *Fortunella*, the most important being the first. Kenya has five species of Citrus fruit trees: orange, lemon, lime, grapefruit and mandarin.

Citrus trees can be grown without irrigation, from the Coast to Trans-Nzoia, in areas as dry as Lake Victoria/Thika and as cool as Kitale. With irrigation they even produce well in the Wajir Zone. For each climate type different varieties may be recommended. Care should be taken to obtain correct varieties. Some are more tolerant of cold than others. They do not like frost, nor the cool nights of the Kericho or Eldoret climate types. Soils for all citrus trees should be deep and well-drained. Medium, sandy loams which are slightly acid are best. They are not strong in the wind, so they require protection by wind-breaks in high-wind areas. Trees do well on flat or slightly sloping ground. Steeper slopes require terracing similar to that done for coffee. For best results citrus trees need 1000mm of well-spaced rainfall. Drier areas, like Kisumu/Murang'a or Lake Victoria/Thika type, have seen limited success on well-managed, unirrigated fields, but generally some irrigation is needed during extended drought in these climates. Hot, dry areas like Garissa show good success with irrigation on riverine soils.

Citrus trees have been successful in Kenya, but there have been some disease problems. Recently a 'yellowing-off' disease has affected many of the trees in the country and forced horticultural nurseries to destroy their mother trees. New, disease-free mother trees are growing now. Be sure to consult the local agricultural extension officer before planting seedlings.

Below is a brief description of each citrus species. This is followed by a table of species with their varieties and preferred climate type.

GRAPEFRUIT (*Citrus paradisi*)

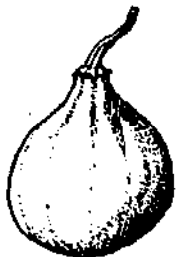


These large, yellow-fruited trees require more heat and rainfall than do other citrus species. In Kenya they are grown primarily at the Coast (Ramisi and Kwale climate types). There are two main varieties: *Marsh seedless* and *Duncan*. Irrigated plots near Lake Victoria may also be successful. In cooler areas the fruit does not sweeten.

LEMON (*Citrus Limon*)



This particular type of lemon is mostly for fruit while the closely related rough lemons are used mostly for rootstock. Generally, lemons tolerate higher and drier areas than other citrus species. Lemon trees have been grown in almost all climates suitable for agriculture in Kenya.



LIME (*Citrus aurantifolia*)

The lime can be produced from seed more profitably than many citrus trees because the seed itself, produces both vegetative and sexually created shoots. The vegetative shoots are more vigorous, and therefore can be easily separated from the single 'sexual' shoot produced by each seed. The vegetative shoots will be true to the mother tree in form and fruit quality, provided that environmental conditions are similar. Producing limes from seed does have one disadvantage compared to budding: a longer wait before fruit production commences, sometimes up to eight years. Budded stock will produce after four years.



MANDARIN (*Citrus reticulata*)

This citrus tree resembles a spineless orange tree in appearance, but produces a smaller fruit with an easy-to-remove rind. Tangerine and satsuma are types of mandarin. They can be produced from seed in a fashion similar to lime. Again, vegetative shoots which will produce true to the mother tree, are more vigorous in growth, but do take longer to reach productive fruiting. One seed can produce many vegetative seedlings. The mandarin is resistant to cool temperatures, but requires warm temperatures for growth. Its range is restricted by average night-time temperatures. Water requirements are similar to the orange.

ORANGE (*Citrus sinensis*)

Oranges are probably the most popular of all citrus fruits worldwide. They are grown extensively at the Coast, in Trans-Nzoia, Machakos, near Thika and elsewhere. There are many varieties grown, each suitable for slightly different climate zones.

AVOCADO (*Persea americana*)

Avocado, as the botanical name indicates, is a tree native to Central and South America. It produces a large, nutritious fruit, higher in calories than any other fresh fruit. It can be grown from the coast to 2,000 metres depending on the variety, as long as there is fairly high rainfall. Areas in Kenya where the avocado is now cultivated include the climate types of Kwale, Migori, Nairobi, Limuru, Kakamega and Kericho.



All avocado are specific in soil requirements. They prefer sandy loams, well-drained to at least 1.5 metres, yet retains moisture and good aeration for the roots. Trees will suffer or die in excessively wet

or saline conditions. A neutral to slightly acid soil is best. They also grow best when well-mulched and weeded around the base. Shorter crops, like beans, can be grown around them until shade becomes too thick.

The avocado can be grown from seed, but this is risky because the quality and quantity of fruit production is highly unpredictable. If you grow many trees from seed, you can select the trees producing well and cut the others down for firewood. You can also graft on to seed-grown root-stock, with selected varieties chosen for climatic conditions of your area. Seeds are sown with the broad end down about 2 to 3 cm deep. Grafting or budding is done when the tree is 30 cm tall at a point about 15 cm above the soil. Trees will begin to fruit

TABLE OF CITRUS FRUIT VARIETIES

SPECIES VARIETY	PREFERRED CLIMATE TYPE	ALTITUDE (METRES)	PRESENT GROWING AREA
Grapefruit			
Marsh seedless	Kwale	0-1400	Coast
Duncan	Kwale	0-1400	Coast
Lemon			
Eureka	Kisumu/ Murang'a	1000-1500	Kisumu
Lisbon	Nairobi	1000-1800	Kitale
Villafranca	Kisumu/ Murang'a	0 1600	Kisumu
Lime			
Tahiti	Kwale to Nairobi	0-1800	Thika
Bayer's	Kwale to Migori	0-1500	Coast
Mexican	Kwale	0-1000	Coast
Mandarin			
Kara	Kwale to Migori	0-1500	Coast
Kino	Kwale to Migori	0-1500	Coast
Minneola	Nairobi	0-1800	Kitale
Satsuma	Migori	0-1500	Coast
Orange			
Hamline	Lake Victoria/Thika	0-1500	Machakos
Pineapple	Kwale	0-1500	Coast
Trovita	Kwale	0-1000	Coast
Valencia	Kwale to Nairobi	0-1800	Juja/ Kitale
Washington Naval	Nairobi	1000-1800	Kitale
Zanzibar Light	Kwale	0-1000	Coast

about five years after transplanting. No pruning is needed, except of broken or dying branches.

There are many varieties of avocado, the most important in Kenya being Fuerte. Horticultural Extension Officers in your area will be able to give more advice on varieties and other questions about avocado production.

CASHEW NUT (*Anacardium occidentale*)

The cashew tree is another of the many imports from tropical America, this time the Brazilian coast. It is a large spreading tree, tolerant of drought and produces fruits, nuts and firewood. Along with coconut, the cashew is the most widely planted fruit/nut tree at the Kenya coast. It does best at low altitude on sites receiving 800 - 1200 mm of rain (Kwale and Limuru climate types). Attempts along the shores of Lake Victoria and in lower Embu and Meru districts have proven successful though nut production is slightly lower (Kisumu/Murang'a and Lake Victoria/Thika climate types).

One of the cashew tree's strong points is its ability to grow and produce on poor soils, eroded sites and waste land. It seems to thrive on hard laterite soils if spacing between trees is sufficient, but it prefers sandier soils. The root system spreads about twice the diameter of the crown of the tree and dislikes root competition from other cashews. So spacings of 15 metres are needed for mature plants. Cashews are not salt-tolerant.



Trees can be grown from seed, but because results are variable grafting is recommended. You should sow only fresh seed (viability is around 3 months in air-tight storage) which sink when placed in water. Large, dense seeds produce best growth. Fresh seed can be sown direct into pots. Grafting from good quality mother trees can take place about 6 months after germination.

Another method of propagation used is air layering. This method results in earlier nut production but is more labour-intensive. When the cashew tree is flowering, select an unflowering branch. Make a ring cut in the branch 3-6 mm wide and 15-25 cm from the tip. Around this cut place a mixture of wood chips and shavings and hold them there with a plastic wrap. The wood chips must be moist. Leave this on the tree about 45 days. By then roots will have formed. Moisten the wood chips again and then cut the branch half way through below the plastic wrap. Deepen the cut one week later. After 4 days the rooted sapling can be planted where desired. If planted direct in the dry season, it will require watering until the rains begin.

GUAVA (*Psidium guajava*)



The guava is a small tree or shrub which originally came from tropical America. It is long-lived and quite hardy. In Kenya it has become naturalized in the moister areas of South Nyanza, Kisumu and Kakamega. It tolerates even seven months of drought and produces good fruit without irrigation in the Lake Victoria/Thika climate types. Guava trees should do well in the following climate types: Kwale, Lamu, Migori, Kakamega, Kisumu/Murang'a, Nairobi, Lake Victoria/Thika and perhaps Rumuruti/Narok. It will grow in drier areas with irrigation.

The tree can be produced from seed with good results. Seeds should be fresh, though those stored for up to a year, if kept cool and dry, will germinate well. Sow seed in a seed-bed 1 cm deep and prick-out to pots when about 3 cm high. Germination may take 3 weeks. It can be grown in an open-ended pot and tolerates root pruning very well. Transplant to its permanent location when the tree is about 30 cm tall.

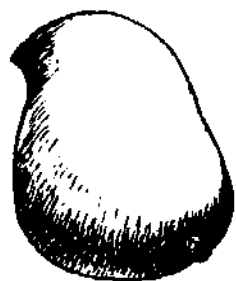
The guava begins to bear fruit at about four years of age. Fruit is produced at the tips of branches. Often the tree will get crowded toward the centre, especially at first, and these interior vertical branches should be pruned.

Guava fruit varies in size and shape. Seed should be obtained from trees producing larger fruits of the type preferred. There are two major types; pink-fleshed and white-fleshed fruits. They are both excellent sources of Vitamin C and minerals. Fruit should be ripened on the tree to the point where the flesh begins to soften.

MANGO (*Mangifera indica*)

The mango is a large, long-lived fruit tree from India. Older mango trees can be found in East Africa along old slave routes, especially in Tanzania. The fruit is large, with yellow-orange flesh when ripe, containing a single large stone. The delicious flesh is richer in Vitamin A and C than that of the orange.

The mango is drought-tolerant up to a point and actually requires a long dry season for best fruit production and flavour. It can be grown along the Tana River at Garissa without irrigation once the roots have reached the water table. Most of the production in Kenya is along the coast, but two varieties will do well at elevations as high as Nairobi. Suitable climate types include Kwale, Lamu, Migori, Kisumu/Murang'a, Lake Victoria/Thika, Kajiado, Isiolo/Taveta and even drier if planted in riverine settings.



The most common method of reproduction in Kenya is by budding or grafting. This method will ensure a harvest within 4 to 5 years. Some mango varieties are polyembryonic in that a single seed produces multiple shoots. Most of these shoots are vegetative, carrying the same traits as the mother tree. One shoot, normally less vigorous, is produced sexually and should be removed, for it may be less productive than its parents. Extra vegetative shoots can be either removed or transplanted to different pots after attaining 15 cm in height. One can grow a mango from seed in this style and get a good quality tree the drawback being a longer wait for fruit production to start.

Mango seed germinates readily if sown about 2cm deep in moist soil soon after removal from the fruit pulp. It can be sown direct, if one is growing the tree from seed. For grafting or budding, sowing seed in large polythene pots, or other firm containers, is recommended. Seeds do not keep well, lasting only about one month at room temperature.

Grafting normally takes place after one year. The tree may flower in the next year, but it is recommended that all flowers be removed from the first to third year after grafting and transplanting so that the tree develops better.

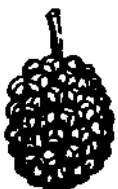
Fruits ripen best on the tree. They can be picked when the fruit is losing its green colour and when the flesh is still firm.

Kenya has a number of mango varieties. The sources of seedlings in your area will have those appropriate. For the coast the recommended varieties are Apple, Boribo, Kent, Ngovo and Sensation. Of these, Sensation and Kent are generally the most successful, whereas near Lake Victoria, in Central Province and in Machakos and Kitui districts Sabra and Peach varieties perform best.

MULBERRY (*Morus alba*, *Morus nigra*)

The mulberry is one of the more useful fruit trees grown in Kenya, even though few have taken advantage of its potential. The most common type available is *Morus alba*, which has been primarily developed for its leaves, used as feed for silkworms. Leaves also make good fodder and young leaves at the end of the branch are edible. *Morus nigra* produces more and darker fruits than *Morus alba* but it is not usually used for other purposes. Both are long-lived, produce large amount of fruit and are easy to maintain.

Despite originating in a temperate climate, the mulberry is drought-resistant and tolerant of heat. It grows well in the Lake



Victoria/Thika climate type and is being tried at Isiolo. It also does well in higher rainfall zones, even up to 2,000 metres, in Nairobi, Limuru and Eldoret climate types.

The mulberry grows easily from seed, but this method takes a long time to produce fruits. The best and easiest method of propagation is from cuttings. These can be obtained from any local tree, or can be purchased from the National Horticultural Research Station at Thika. To take cuttings from mulberry, simply strip the leaves off a young branch, taking care not to damage buds in the process. Cut the thin spindly end off, then clip the branch at a point where it is around 1.5 to 2cm in diameter. What you will obtain will probably be a stick two metres long. Cut the number of sticks you require and take them to the planting site. They can be planted as they are in wet soil to 40cm depth. The stick can also be cut into sections of 3 buds each. These 20cm long sections can be planted in pots or 2 buds deep in moist soil in the ground, with the last bud about 2cm above the soil line. Rooting takes place quickly, and the tree may bear its first fruit in a year.

The mulberry will thrive in any soil, though it prefers a loamy one. In dry areas watering will increase fruit production. Occasional pruning back does not harm the tree and may increase fruit production. In areas frequented by goats, it is wise to train the tree to grow tall and prune it at a level about 2 metres high because goats find the leaves quite tasty. Birds too, are great eaters of the fruit.

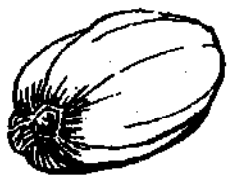
PAWPAW (*Carica papaya*)

The pawpaw is not a true tree in that it does not produce wood. It is however, a valuable fruit producer, easy to grow, with quick returns for labour. The pawpaw can be grown without irrigation, from the coast to 2,000 metres and along Lake Victoria. It is not affected by waste-water irrigation and does not require large amounts of water even in very dry areas.

Pawpaw must be propagated from seed and this is not difficult. Seed can be taken from any plant producing good fruit in your location or (if a special type is required), can be obtained from the seedling sources listed at the end of this section. These seeds are coated with a wet covering which should be removed before sowing. Dried seed kept in air tight containers remains viable for years. Sow the seed in a pot or small seed-bed about as deep as the seed is broad. Germination is quick. Transfer individual seedlings to pots when about 5cm tall. These can be transplanted when about 30cm tall, to a



permanent site. Growth is very fast. First fruits will be ready in a year or less. Pawpaw are short-lived, decreasing in production after the plant is 4 years old.



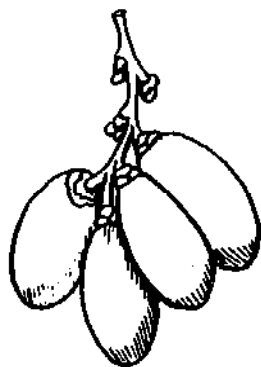
Perhaps the most confusing thing about the pawpaw is the sex of the plant. The pawpaw are dioecious, having male and female trees. Sometimes trees can change from male to female in the course of their life. Some varieties like Hawaiian types are hermaphrodite, having both male and female parts on the same flower. Some plants have male flowers on long flower stems called peduncles which have a terminal female flower producing a long narrow fruit. Other plants may have variations on the above theme. Seeds usually produce an equal mix of male and female trees. As only about one male for every 50 or so female trees is needed, the rest of the males can be removed. You can never know if your trees are male, female or otherwise until the flowers have set.

The fruit is not only useful when ripe; unripe pawpaw contains an enzyme called papain which is an aid to digestion and is the main ingredient in meat tenderizer. (Pawpaw leaves wrapped around meat have the same tenderizing effect.) It can be cooked green and served like pumpkin. Ripe fruit is a good source of vitamins, especially A and C.

The type of pawpaw often called Mountain pawpaw thrives at heights of 3,000 metres. It is frost-tolerant. Fruits of the Mountain pawpaw are quite small, but have a delicious flavour.

DATE PALM (*Phoenix dactylifera*)

According to Muslim tradition, the date palm was created especially for man from the clay left over after God made Adam. This palm has long been a major source of food for desert people of North Africa and the Middle East. It was brought to the coast of Kenya by Arab traders. Some plantations were functioning in the north of Lamu as late as fifty years ago, but few have since been added.



The date palm has the potential to be a good source of food and revenue in the drier areas of Kenya. It thrives in areas of hot temperatures, low rainfall with long dry seasons and high water tables; without a high water table irrigation is required. Some palms can now be found near the Tana River in Garissa and two of them are growing in Isiolo. Other areas of prime growing potential include Lake Turkana's shores, and the basins of the Ewaso Ngiro and Dawa Rivers in North-East Kenya. It is said that date palms will grow on any site where the indigenous Doum palm grows.

Date palms reproduce easily from seed. These keep well and can be obtained by purchasing dates imported to Kenya from the Middle East or Somalia. Seeds should be sown about 1cm deep in regular nursery soil. Germination is normally good without pre-treatment. Unfortunately, production of dates from seed leads to highly unpredictable fruiting. Fifty percent of the seed-produced trees will be males, a far higher percentage than is needed since only one male is needed to fertilize 30 or so females. Also it takes longer to get a crop from seed than from offshoots, which is the preferable method of propagation.

Until palms are twenty years old, they produce offshoots or suckers around their base. These are allowed to grow until their base is 15cm in diameter. By then they will weigh about 6 or 7 kilograms. Larger offshoots can also be taken but transport difficulties make this size the best. Offshoots are normally trimmed back, the inner leaves to one half their length, the outer leaves to one third. After a wait of four or five days they are severed from the tree by cutting. They should not be pried away, as this may kill the offshoot or damage the mother tree. It is not necessary to cut deeply into the mother tree to sever the offshoot as it is attached near the surface.

Once it is removed from the mother tree, the offshoot must be seasoned and dried to prevent fermentation and death. It can be left under the tree to season for 10 days or so in the dry season. Usually this means that the palms lose about a kilogram in weight.

Offshoots can then be planted straight where they are required or rooted first in a place of high temperature and humidity. The offshoot is planted about 20cm deep in well-manured sandy soil which has been thoroughly watered beforehand. If successful, the offshoot could begin producing fruit in 4 or 5 years.

As mentioned earlier, date palms require either regular irrigation or a high water table. They are tolerant of flooding, but dislike rain at flowering or fruiting time. Kenya has two flowering times. January-February and August-September. Date palms are tolerant of alkaline soils but best production occurs on well-drained neutral soils. Red alluvial soils near rivers are very suitable.

The key to good date production is hand pollination. When the spathe containing the waxy-white male flowers opens, it should be cut and the flowering stalks placed in a large paper to dry. Pollen will fall off the flowers and dry. Dry pollen kept cool in sealed containers, will last many years. The female (pistillate) flowers should be pollinated as soon as the covering of the flower stalk (spathe) opens. For this purpose, three or four cotton wool balls of about 1.5cm in diameter



are dipped into the collected pollen and placed inside the spathe. In 6 to 7 months, with proper irrigation, a good crop should be ready to harvest.

Date palm production, to be done well, requires more information than is given in this brief description. For more information, look up the reference listed in chapter 5.

Seed sources for date palm are the places which sell dates. There are a few places in Kenya which have growing date palms of the age where root suckers and offshoots are available. Most of these were planted by a joint Kenya Government/FAO project in the early and mid 1970s. Many were planted at two irrigated farms in Turkana District along the Turkwell River, Kaikorongole and Kitalu. There are also some date palms producing, at First Farm in Garissa. For more information on offshoot sources in Kenya write to the Mennonite Central Committee, Seed Bank, P O Box 47596, Nairobi.

COCONUT (*Cocos nucifera*)



Many plant historians think that the coconut palm originated in South America and began its westward journey across the Pacific to Africa many thousands of years ago. The coconut has been growing along the Kenya coast for hundreds of years and comprises a major part of the coastal diet. The best areas for growing coconut are coastal with at least 1 metre of rain annually. Some areas of the Kenya coast, like Lamu, receive less rain but a high fresh water table offsets the deficit. The best climate types for coconut in Kenya are Ramisi, Kwale and Lamu. Some limited success with coconut has occurred in the Lake Victoria/Thika, Kisumu/Murang'a and Migori climate types, but nut production is not as good.

Propagation of coconut palms is only by seed. Select a nut from a conspicuously good palm and plant it with the 'eyes' upright in a seed bed just under the soil. It will sprout through the largest of these eyes. Carefully transplant when the plumule (first leaf) is 15cm high. Low crops can be planted between the trees until the palm begins to shade them out. After 4 years it is recommended that cattle be pastured in the coconut field. The first crop should begin at 7 to 8 years.

MACADAMIA NUT (*Macadamia ternifolia*)

Macadamia nuts were brought to Kenya about the same time as widespread cultivation of coffee and tea began. The tree grows in areas where coffee does well without irrigation. The best climate



types appear to be Migori, Limuru, Kisumu/ Murang'a and Nairobi. It will grow in Kakamega and Kericho climate types but production may be lower. Like coffee, with irrigation it will do well in the Lake Victoria/Thika climate type.

The macadamia tree produces a white-fleshed nut which is regarded as a delicacy in the West. Much work has been done on improved varieties in Hawaii and Australia and some of these are now available in Kenya through the National Horticultural Research Station at Thika. Macadamia can be grown from the very hard seed, which is cracked and sown in porous sandy soil. It takes about a month for germination and requires about 6 months to reach trans-planting height. However, growing macadamia from seed leads to highly variable nut production, so it is better to get improved, grafted seedlings from the sources indicated.

The soil types preferred by macadamia are deep, rich loams, well-drained, very similar to soil for coffee. The trees grow slowly, reaching a maximum of height of about 15 metres. They do not require pruning. Nut production begins when the tree is between 6 and 8 years of age. When large, older trees drop in production, they can be used for timber which is said to be of high enough quality for furniture.

SEEDLING OR SEED SOURCES FOR FRUIT TREES

There are two major sources of fruit tree seedlings. The Ministry of Agriculture and Livestock in co-operation with the Ministry of Home Affairs, has established fruit tree nurseries at 26 of Kenya prisons. These have proven successful in a variety of ways, the most important for our purpose being the production of good quality fruit tree seedlings.

The second major source, directly under the Ministry of Agriculture and Livestock is the National Horticultural Research Stations and Farmers Training Centres. These two sources are probably the best for stock which is either grafted or budded, as they usually have available all the varieties of fruits listed as appropriate for the local climatic zone.

These two sources are not the only ones by any means. Many independent groups and organisations now have nurseries growing fruit trees. If none of the sources listed here is close to your area, consult the nearest Agricultural Extension Officer for where to look for seedlings.

COAST PROVINCE

Hindi Prison P O Box 46 Lamu
Kwale Prison P O Box 7 Kwale
Kilifi Prison P O Box 47 Kilifi
Malindi Prison P O Box 373 Malindi
Manyani Prison P O Manyani via Voi.
Shimo la Tewa Prison P O Box 90152 Mombasa
Mtwapa F.T.C. P O Box 40290 Mombasa
Farmers Training Centre P O Box 1035 Wundanyi
Coast Agricultural Research Station P O Box 16 Kikambala

Seedlings Available

Banana	Hawaiian Pawpaw	Avocado
Cashew	Lime	Sugar Apple
Coconut	Mango	Soursop
Grapefruit	Orange	Tangerine

CENTRAL PROVINCE AND NAIROBI

Kerugoya Prison P O Box 7 Kerugoya
Kiambu Prison P O Box 21 Kiambu
Nyeri Prison P O Box 15 Nyeri
Kamiti Prison P O Box 47472 Nairobi
Nairobi New Prison P O Box 363 Ruiru
Nairobi West Prison P O Box 30556 Nairobi
National Horticultural Research Station P O Box 220 Thika
Wambugu Farmers Training Centre P O Box 29 Nyeri
Waruhiu Farmers Training Centre P O Box 31 Githunguri
Kenyatta Farmers Training Centre P O Box 59 Murang'a
Nyahururu Agricultural Research Station P O OI Joro Orok
Ol Joro Orok Farmers Training Centre P O OI Joro Orok
Njabini Farmers Training Centre P O Box 15 South Kinangop

Seedlings Available

(Not all seedlings are available at each of the above locations due to climate differences)

Orange	Macadamia Nut	Loquat
Lemon	Mango	Guava
Lime	Mulberry	Avocado
Tangerine	Fig	Pear
Apple	Plum	Peach

The following two prisons in Central Province have available the coastal fruit varieties (except coconut).

Maranjau Prison P O Box 109 Murang'a

Mwea Prison P O Box 112 Wanguru

In addition Mwea has Breadnut, Breadfruit and Jackfruit seedlings.

EASTERN PROVINCE

Embu Prison P O Box 38 Embu

Machakos Prison P O Box 150 Machakos

(Marsabit Prison P O Box 16 Marsabit—small nursery)

Machakos Farmers Training Centre P O Box 27 Machakos

Kaguru Farmers Training Centre P O Box 12 Meru

Embu Agricultural Research Station P O Box Embu

Seedlings available (highland varieties)

Avocado	Orange	Macadamia
Apple	Tangerine	Loquat
Guava	Lemon	White Sapota
Mango	Lime	

Isiolo Prison P O. Box 1 Isiolo

Kitui Prison P O Box 122 Kitui

Seedlings available (coastal varieties)

Mango	Hawaiian Pawpaw
Orange	Banana
Lime	Sugar Apple
Tangerine	

NORTH EASTERN PROVINCE

Because of the adverse climate, fruit trees can only be grown along the two permanent rivers or in locations where irrigation is possible.

Garissa Prison P O Box 50 Garissa

Garissa Agricultural Research Station P O Box 230 Garissa

Seedlings Available

Banana	Lime	Papaw
Orange	Tangerine	
Grapefruit	Mango	

Limited quantities of Date Palm seed and root suckers are available from First Farm, Garissa.

NCKK Rhamu Service Centre P O Box 19 Mandera

Orange

Grapefruit

Mango

Pawpaw

NYANZA AND WESTERN PROVINCE

Homa Bay Prison P O Box 42 Homa Bay

Kisumu Prison P O Box 1923 Kisumu

Kibos Prison P O Box 1725 Kisumu

Homa Bay Farmers Training Centre P O Box 71 Homa Bay

Maseno Farmers Training Centre P O Box 173 Maseno

Bungoma Prison P O Box 56 Bungoma

Busia Farmers Training Centre P O Busia Market

Bukura Institute of Agriculture P O Box 23 Bukura

Seedlings available (mainly coastal varieties)

Banana

Lime

Avocado

Cashew

Lemon

Sugar Apple

Grapefruit

Mango

Soursop

Hawaiian Pawpaw

Orange

Tangerine

Jackfruit

Breadfruit

Kisii Prison P O Box 93 Kisii

Shikusa Prison P O Box 77 Kakamega

Kisii Farmers Training Centre P O Box 52 Kisii

Kaimosi Farmers Training Centre P O Box 4 Kaimosi

Western Agricultural Research Station P O Box 169 Kakamega

Seedlings available (highland varieties)

Orange

Macadamia

Plum

Lime

Mulberry

Peach

Lemon

Loquat

Apple

Avocado

Custard Apple

RIFT VALLEY PROVINCE

Eldoret Prison P O Box 824 Eldoret

Kericho Prison P O Box 329 Kericho

Kitale Farm Prison P O Box 74 Kitale

Naivasha Prison P O Box 146 Naivasha

Nakuru Prison P O Box 14 Nakuru

Narok Prison P O Box 13 Narok
Ngeria Prison P O Box 461 Eldoret
Baringo Farmers Training Centre P O Box 72 Eldama Ravine
Kabianga Farmers Training Centre P O Box 204 Kericho
Ngong Farmers Training Centre P O Box 24919 Nairobi
Chebororwa Farmers Training Centre P O Box 3033 Moiben
Kamweti Farmers Training Centre P O Box 1002 Kianyaga

Seedlings available

Orange	Macadamia	Plum
Lime	Mulberry	Peach
Lemon	Loquat	Apple
Avocado	Custard Apple	

Additional Fruit Tree Species

Strychnos spinosa

Mtonga (Swa) Muhonga (Dig) Kyae (Kam).

A large woody fruited species; the hard fruit coat is round and slightly larger than a cricket ball. The fruit pulp is edible but the seeds are poisonous. *S. spinosa* has useful wood, both for heavy furniture and firewood. It grows along the Coast and in Ukambani. Kwale, Lamu, Kisumu/Murang'a and Lake Victoria/Thika climate types (Zone III, 1-3; IV, 1-3; V, 1-3)

***Vitex doniana* (Black Plum)**

Mfudu (Swa, Dig), Muturu (Kik), Mkhulu, Muholu (Luh), Muta-huru (Kis).

The black plum is a widespread tree of wooded savannah, producing a 2cm long, black sweetly edible fruit. Its timber is of high value as well, somewhat durable and easily workable, but not strong. It can be found at the Coast Kwale and Lamu climate types, Meru District, Kisumu/Murang'a and Migori climate types; and in Western Kenya, Kakamega and Nairobi climate types (Zone I, 3-5; II, 1-5; III, 1-5; and riverine IV, 1-4)

***Ximenia americana* (Wild Plum)**

Olemo (Luo), Mutoywo, Muteywa (Seb), Mtundakula (Swa, Gir, Dig) Mukungambura (Kik)

A small tree with a yellow-red edible fruit that is about 2.5cm across. The wood, though of low volume, is useful both for timber and fuelwood. It grows along the Coast; in moister areas of Western and Rift Valley Provinces; and it is suitable for Kwale, Migori, Kisumu/Murang'a, Nairobi, Limuru and Kakamega climate types. (Zone I, 3-5; II, 1-5; III, 1-5)

Cyphomandra betacea (Tree Tomato)

The tree tomato is actually a short-lived bush growing to 3 or 4 metres high and producing pointed, egg-shaped fruits which are red-brown when ripe. They have a tart, tomato-like flavour. The bush bears from seed in the second and third years. Tree tomatoes do well in Nairobi and moister midland and highland areas that are free of frost; Nairobi, Eldoret, Limuru, Kakamega and Kericho climate types, and perhaps lower. (Zone I, 3-6; II, 3-6; III, 3-6)

Terminalia catappa

An exotic tree now widely planted at the Coast, the fruit of which is edible. The tree is called Mkungu in Swahili or Bastard Almond in English. It is normally large-leaved, flat-crowned and grows from the Coast to Nairobi, though in higher elevations no fruit is produced. Best climate types are Ramisi, Kwale and, perhaps, Migori and Kisumu/Murang'a. (Zone II, 1-3; III, 1-3)

Eriobotrium japonicum (Loquat)

Loquat originates in Japan and has been planted widely in the Kenya highlands. Its yellow-ripe fruits are well known in local markets during August. The best climate types are Nairobi, Eldoret, Limuru, Kakamega and Kericho. (Zone I, 3-6; II, 3-6; III, 4-6)

Syzygium cumini (Zambarao)

Zambarao trees were brought to Kenya by Asians during the building of the Uganda Railway. Its edible fruit, shade and firewood make it a valuable tree. It is found in the wetter areas scattered throughout the country, such as Kangundo, Machakos and Nairobi. Migori, Kisumu/Murang'a, Kakamega, Kwale and Ramisi climate types. (Zone I, 3-4; II, 1-4, III, 1-4)

CHAPTER FIVE



References and Resource People

Libraries

Four libraries in Nairobi provided the major sources of the information about trees in this book. They are recommended for further references on the trees of Kenya, especially the botanical reference books in the subsequent section.

- 1 The Forest Department Library, Forest Department Headquarters, Kenyatta Avenue, Nairobi.
- 2 Kenya Agricultural Research Institute Library KARI, Muguga.
- 3 International Council for Research in Agroforestry (ICRAF) Library, Bruce House, Nairobi.
- 4 The East African Herbarium Library, The National Museum, Nairobi.

The Herbarium is undoubtedly, the best information centre in East Africa about trees. All the major botanical reference materials can be found there, along with extensive well-organised identification stacks. Much of the information on seeds found in this volume was obtained by examining these samples and the botanical/vernacular name file was particularly useful. The staff at the Herbarium were most helpful and supportive of our efforts in tracking down the information.



BOTANICAL REFERENCES

DALE, I.R. and GREENWAY, P.J. *Kenya Trees and Shrubs*.

Buchanan's Kenya Estates Ltd., in association with Hatchards, London, 1961.

The most useful botanical reference for Kenya trees in a single volume. Unfortunately, it is now very difficult to find.

EGGELING, W.J. and DALE, I.R. *Indigenous Trees of the Uganda Protectorate*. The Government Printer, Entebbe, Uganda and The University Press, Glasgow, 1951.

The information here, especially for timber and other uses complements the information in *Kenya Trees and Shrubs*.

PALGRAVE, K.C. *Trees of Southern Africa* C. Struik Publishers, Cape Town/Johannesburg, 1977.

Many Kenya trees range as far south as Cape Town. This book contains excellent illustrations, providing the best visual identification clues of the three botanical texts.

PALMER, EVE and PITMAN, NORA *Trees of Southern Africa* 3 Vols. A.A. Balkema, Cape Town, 1972.

The most complete text on Southern African trees, many of which are also found in East Africa. Using simplified botanical terminology, this book gives practical information about trees and has excellent illustrations and pictures. *Palgrave* is better for botanical purposes.

LITTLE, ELBERT L. *Common Fuelwood Crops* Communi-Tech Associates, Morgantown, West Virginia, 1980.

This book provides more specific botanical information for the species in *Firewood Crops* (see below) expanding their number to 90.

GENERAL INFORMATION

NATIONAL ACADEMY OF SCIENCES *Firewood Crops* Ad Hoc Panel Report of the Advisory Committee on Technology Innovation, Washington, D.C., 1980.

A helpful resource for many trees found in Kenya, with photographs, climate information and uses, etc.

FOOD AND AGRICULTURAL ORGANIZATION (FAO) *Eucalypts for Planting* FAO, Rome, 1979.

A worldwide look at Eucalyptus trees, where they grow and how to grow them. Includes pictures of Eucalyptus in Kenya.

NATIONAL ACADEMY OF SCIENCES *Tropical Legumes: Resources for the Future* Washington D.C., 1979.

KOKWARO, J.O. *Medicinal Plants of East Africa* East-African Literature Bureau, Nairobi, 1976.

An excellent look at the medicinal uses of plants in East Africa, giving extensive vernacular name lists.

GUTIERREZ, GASPAR DE LA LAMA *Atlas del Eucalipto* Tomo I. Information Y Ecologia, Ministerio de Agricultura, Sevilla, Spain, 1976.

INVENTORIES

FOREST INVENTORY SECTION *Reconnaissance Inventory Report of the Indigenous Forest of Kenya* Field Surveys 1963-1971, Supplementary Report. Kenya Forest Department, Nairobi.

This report tells how much you will find of forest species in 31 separate gazetted forest areas.

FLIERVOET, ELS, *An Inventory of Trees and Shrubs in the North Division of Machakos District* Wageningen Agricultural University, Department of Forest Management, The Netherlands and ICRAF, Nairobi, 1982.

MAPS

KENYA SOIL SURVEY *Exploratory Soil Map and Agroclimatic Zone Map of Kenya 1980* Exploratory Soil Survey Report No. E1, Kenya Soil Survey, Nairobi, 1982.

DIRECTORATE OF OVERSEAS SURVEYS *Kenya Vegetation Map Sheets 1-3, scale 1:250,000* British Government Ministry of Overseas Development, Special Commonwealth Assistance Plan of 1975-1976 and Survey of Kenya, 1976.

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WEBER, FRED R. *Reforestation in Arid Lands* Volunteers in Technical Assistance (VITA), MS No. 37E, 1977.

BUCK, L.E. (Ed.) *Proceedings of the Kenya National Seminar on Agroforestry, 12-22 November, 1980* ICRAF and University of Nairobi, 1981.

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SMITH, D.L. and OBEL, E. *Uses of Trees and Shrubs Identified by Rural Children in Kenya* Mazingira Institute, Nairobi, 1980.

DOUGLAS, S.J. and HART, R.A. *Forest Farming* Rodale Press, Emmons, P.A., 1976.

HOEKSTRA, D.A. and KUGURU, F.M. (Eds) *Proceedings of the ICRAF/BAT Workshop, Nairobi, September 1982* ICRAF and BAT, Nai-

robi, 1983.

MENGECH, A. and AWORRY, A. (Eds) 'Tree Planting and Agroforestry in Semi-Arid Zones of Kenya,' *Proceedings of the KENGO Workshop, Kitui, October, 1982.* KENGO, Nairobi, 1982.

KAMWETI, D. *Tree Planting in Africa South of Sahara* Environment Liaison Centre, Nairobi, 1982.

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WILSON, P. *Manual of Tropical and Subtropical Fruits* The Macmillan Co., New York, 1924.

SIMMON, A.F. *Growing Unusual Fruits* Daniel and Charles, Ltd, Great Britain, 1972.

MAILLER, V. *Nursery Management Manual* Soil Conservation Extension Unit, Ministry of Agriculture and Livestock, Nairobi, 1981.

GRIESBACH, J. 'The Avocado: A Most Promising Fruit for the Local and Export Markets' *Kenya Farmer*, November issue, 1980, p. 13.

GRIESBACH, J. *A Guide for Establishing and Maintaining an Orange Plantation in the Trans Nzoia District of Kenya.* Ministry of Agriculture, and Livestock Kitale, 1972.

OHLER, J.G. *Cashew* Koninklijk Institute voor de Tropen Amsterdam, 1979.

SMEAD, P.F. *Date Culture: Irrigated Crops for Arid Regions* Report prepared for the Government of Kenya by FAO, Rome, 1976.

RESOURCE PEOPLE

In the course of writing this book I consulted many people with a knowledge of trees. The information they provided ranged from single items about the use of propagation of particular species, to large contributions of valuable information from those with wide experience. Their assistance has greatly enhanced the usefulness and validity of this volume. Their names are given below. Some of these people are on short-term contracts, but their projects or positions are on-going ones which will be directed by others just as interested in trees planting and rural tree development. There may be some whom we have failed to credit, a factor inevitable when so many people have helped. To them we give our thanks as well.

ICRAF International Council for Research in Agroforestry
KARI Kenya Agricultural Research Institute
KENGO Kenya Energy Non-Governmental Organisations

MR EDWARD ALITSI, Project Coordinator, Agroforestry Plots for Rural Kenya, Mazingira Institute, Nairobi

MR GORDON ARMSTRONG, Silviculturalist, Embu-Meru-Isiolo Project, Provincial Forest Office, Embu

MR ACHOKA AWORRY, Coordinator, KENGO, Nairobi

MR EDMUND BARROW, Turkana Project, NORAD, Lodwar

MS LOUISE BUCK, Agroforestry Planning Consultant, CARE-Kenya

MR BEN CHIKAMAYI, Research Officer, KARI Muguga

DR AMARE GETAHUN, Team leader, Ministry of Energy Agroforestry Project, Nairobi.

MR J. GRIESBACH, Horticulturalist, Ministry of Agriculture, Nairobi.

MR STEVEN GRONSKI, Peace Corp's, Ministry of Energy Agroforestry Project, Bukura

MR RENE DE HALLER, Baobab Farms Ltd., Mombasa

MR ELIJAH ISIAHO, District Forest Officer, Busia

MR ISAAC KAHIGA, Kieni Forest Station, Kieni

MR STEVEN MAGONDU KAMAU Nursery Headman, Ministry of Energy Agroforestry Project, Ngong

MR DAVID KAMWETI, Chairman KENGO, University of Nairobi Forestry Department, Nairobi

MS ESTHER KARIUKI, Research Officer, KARI, Muguga

MR KIHKA KIAMBI, Botany Student, University of Nairobi.

MR KIRRINYA, Silviculturalist KARI, Muguga

MR RICHARD LEBELLE, Information Sciences, ICRAF, Nairobi,

MR MICHAEL LONG, East Pokot Agricultural Project, Kositei

MR BILL MACKLIN, Peace Corp, Ministry of Energy Agroforestry Project, Ngong.

MR HAROLD MILLER, Country Representative, Mennonite Central Committee, Nairobi

MR CYRUS NDEGWA, Forester, Ministry of Energy Agroforestry Project, Nairobi

MR S.K. NJUGUNA, Director, National Horticultural Research Station, Thika

MR NYORO, Forester, Rural Afforestation Extension Service, Nyeri.

MR G. OCHIENG, Provincial Forest Officer, North Eastern Province, Garissa

DR J. ODERA, Deputy Director KARI Muguga

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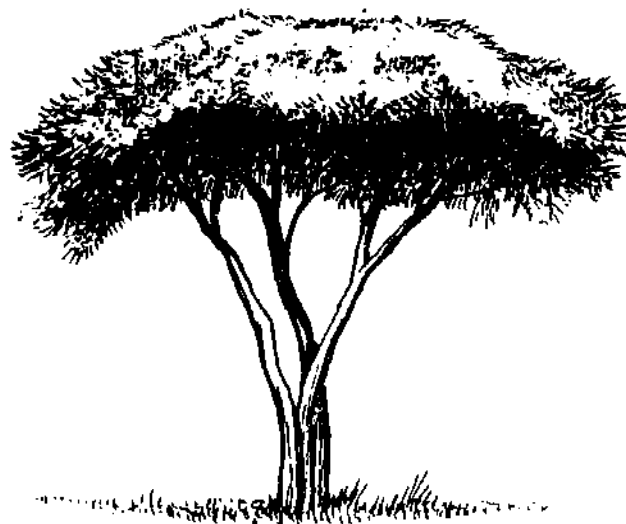
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Information Exchange

Kenya is rich in indigenous trees. We have only mentioned a few of them. Kenya is also rich in information about trees, but this information is often hidden in places where most people do not have access to it. Perhaps you or someone you know can enlighten us further about trees or their uses.

There are many people interested in a broad range of information about trees. We have identified nine categories which require more input:

1 Need for trees and tree products in Kenya

We have touched on only a few items about trees and their value. Many more could be mentioned, and all should be looked at more thoroughly.

2 Use of tree products

How are trees used? In what manner? Could we better farm trees if we had a greater understanding of their end use?

3 Integrated agroforestry/silvopastoral system

Trees are important both for farms and pastoral systems. The things we understand about trees and rural development at present are only a small part of what could be learned and shared. How can trees be used to increase crop yields? Provide a crop? In what ways can trees be managed to insure better survival of livestock?

4 Extension and communication

What is the best way to spread information about trees? How can we best give it to others?

5 Cultural and ethical factors

The environment and resources of any area are an intimate part of that culture. Growing trees could be enhanced by knowing how they are understood within the culture.

6 Quantitative information about forestry and rural tree development in Kenya

This is sadly scarce. How, why and where have people planted trees in the past? We do not know either, how much is happening now. Ideas and activities that are successful are not being spread to more people.

7 Nursery techniques

Most of the available information on nurseries and tree growing is geared towards large-scale production. Small-scale work is neglected. How does one organize, run and maintain a small rural tree nursery? More information for the small scale operation needs to be collected.

8 Tree planting

Trees, successfully grown in nurseries, often die soon after planting out. Many things may lead to failure other than incorrect species selected. How do you plant a tree? How do you protect it until it grows out of reach of sheep and goats? What type of care do young trees need? There are many known good techniques that would increase survival chances for newly transplanted seedlings. These need to be recorded and distributed widely to help others with their planting.

9 Protection and management of tree stands

Once trees are growing, protected and well established, how can they be managed for best production? When is the best time to harvest? How does one best pollard good fodder trees? What techniques are best for coppicing? Good answers are needed for these and other questions on management.

As mentioned in the introduction, one of the chief objectives of this volume, is to help establish a seed and information exchange network. Both information and seeds promote tree planting. You or your group can be both seed sources and gatherers of information. What you know may seem unimportant to you, but it could be very valuable to someone else.

CONTACT KENGO

We would like you to send your information to us at KENGO

Addresses and Climate In the letter write the name of your

group and the postal address. Also we would like to know the name of the nearest town. To help our understanding of the climate range of each tree you mention, *please write down your climate type as explained earlier in the text.*

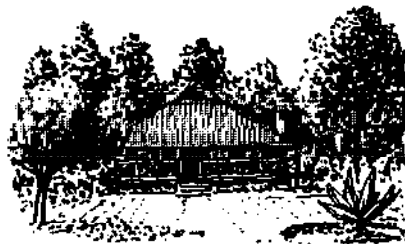
Uses The uses of the tree are very important. Is it good firewood, or does it provide a wind-break? Do you get medicine from the bark or roots? Is the fruit edible? Mention any other uses.

Growing site Sometimes there are only a few trees in an area. Other times many of the same type grow in one place. Usually this is a sign of the tree's climax area, an important thing for us to know. Another item of interest is where a tree does best. Does it grow next to a stream? Is the soil black cotton, red, brown, or deep and sandy? Where does it grow best?

Seeding time Seeding time for trees is highly variable. Some seed is ready at the beginning of the rains, some at the end. Other trees have seed only once a year, others even less. What time of year is seed available from the tree you are writing about? Can you collect it and send it to others? Please let us know.

Cultural interest Many trees have ceremonial uses, or have important stories connected with them. These uses and stories are valuable for understanding how a tree is perceived in a certain place; perhaps you can tell us a piece of the story. Also any other information you consider important about the tree can be put under the last section.

Send this letter to: Tree Seed, c/o KENGO, P.O. Box 48197, Nairobi, and we will be pleased to use your input to help others find the information and seed sources they need to plant trees. Also your information, with you receiving credit, will appear in any future revised edition of the Pocket Dictionary.



TREE SEED INFORMATION FORM

(Sample)

Local Name: *None* Language: *—*Botanical Name: *Prosopis chilensis***Location of Mother Tree(s)**Owner of Land: *National Christian Council of Kenya*Location (Village): *Rhamu*Division: *Rhamu* District: *Mandera***Type of soil (select the closest)**

Red

Black cotton

Stony, rocky

Sandy

Riverine

Deep, brown

Form of Mother Tree(s) (Select closest)

Tall, straight, clear bole

Medium, twisted

Tall, spreading

Short

Medium spreading

Short, young slender

Date of which seed collected: *January 1984*Expected viability: *very long.*Approximate weight of 1000 seeds: *70 grams***Results of germination test:**Date test started: *4 April 1984*Number of seeds tested: *100*Date of first germination: *10 April 1984*Date test completed: *21 April 1984*Percent germinated *91%*

Advice about sowing, seed pre-treatment nursery handling, etc.

None.

GLOSSARY

acid: usually encountered when discussing soil types. An acid, or sour soil, can adversely affect the growth of some trees like *Leucaena leucocephala*

agroforestry: there are many definitions of agroforestry. Essentially it refers to a deliberate, managed use of trees within an agricultural or pastoral land use system. In other words, growing *Acacia tortilis* on your land for goats to eat the pods is agroforestry. Growing *Sesbania sesban* as a coffee shade or soil stabilizer is agroforestry. ICRAF (International Council for Research in Agroforestry) defines it this way:

Agroforestry is a collective term for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land management unit as agricultural crops and/or animals, either under the same form of spatial arrangement or temporal sequence. In Agroforestry systems, there are both ecological and economic interactions between the different components.

(Bjorn Lundgren and J.R. Raintree A Preliminary Agroforestry Word List with Definitions. R. Labelle, Nov. 83, ICRAF Working Paper No. 9).

alkaline: also encountered when discussing soil types. Alkaline, basic or bitter soils, adversely affect the growth of some trees. Often they have a high salt content. White, stony soils are commonly alkaline.

alluvial: these are soils put down by rivers, usually having a high silt content, common along the bottom of river valleys. Often they are nutrient-rich and support abundant vegetation.

arid/semi arid: refers to climates with low rainfall. Arid climate types in Kenya include Wajir, Magadi/Garba Tula and Kirimun. Semi-arid areas have more vegetation and include Taveta/Isiolo, Kajiado and Maralal/Nai-vasha climate types.

black cotton soil: a dark soil with a high clay content. Very sticky and gummy when wet and cracks widely when it dries out. Only a few tree types survive on this soil. It is most common in low-lying flat areas with seasonal streams.

browsing: animals which prefer eating trees and bushes, like goats, camels, giraffe, gerunuk and black rhinos are called browsers. This is in contrast to grass-preferring animals like cattle, sheep, gazelles, eland and white rhinos.

budding: a technique used to obtain new fruit trees with the same characteristics as those already producing good quality fruit in quantity. A bud is cut from a mother tree and spliced into the bark of a young seedling. For advice on this technique see the *Nursery Management Manual*.

bush: has two meanings of importance. 1 When referring to a single plant it usually means a small tree, less than say, 10 feet.

2 In general use it means uncleared wild country, e.g. 'I am going to the bush.'

capsule: a term used by botanists to describe a variety of different types of seed cases. Usually it refers to a hard outer protective cover. They are often pod-like, though the term pod is generally reserved for legumes.

coppice: a method of cutting certain species of trees to encourage them to regrow from the remaining stump. A tree which coppices readily does not require replanting as often and is therefore, more useful as a fuel and pole tree. *Markhamia platycalyx*, *Leucaena leucocephala* and most eucalyptus coppice well.

cutting: to grow a new plant from an old one it is possible to cut a piece of some types and it will root and grow. Sometimes, these cuttings must be rooted in water or sterile soil first. In many cases, such as with figs or the mulberry, small cuttings will root in wet soil quite easily. They can be as long as a fence post or as short as 3 inches for some species.

deciduous: a tree which loses all, or some of the leaves at certain times of the year. In arid areas many species lose their leaves soon after the dry season begins. Others lose leaves later in the dry season.

ecology: *Ecology* is the Greek word for living earth. Ecology is the study of the interactions of living things. Certain plants and animals require specific conditions to live well and this is often termed the ecology of that animal or plant.

root stock: when budding or grafting, it is desirable to have a variety of seedlings which produce strong healthy roots. Since the genetic makeup of the roots will be different to that of the fruiting tree, it is important to select the correct type so that both will grow well. Good root stock is especially important for citrus fruits.

emulsion: an extract usually of oil, from a solid or liquid. An emulsion from a seed is an extract of oil used for a variety of purposes. See *Balanites aegyptiaca*.

exotic: in the case of trees, exotic means it comes from a foreign source. For example, *Grevillea robusta* comes from Australia and is an exotic species in Kenya.

family: a group of plants or animals which have some common characteristics. For example acacia and albizia trees are members of the same family, *mimosaceae*.

fodder: plants which are eaten by browsing or grazing animals are referred to as fodder plants. Fodder trees include acacia, prosopis, leucaena and others. Normally fodder refers to the green part of the tree, leaves or sometimes flowers and pods. Often fodder is collected and stored for future

consumption by animals.

foliage: a term for the entire leaf mass of a tree or trees. Also applied to leaves and flowers.

genus: a more specific grouping of species showing similar characteristics. Eucalyptus trees are all of one genus. The first capitalized word of a botanical name is the genus.

grafting: similar to budding above, grafting involves taking a small shoot from a desirable mother tree and attaching it to a young seedling in such a way that it will become the fruiting part of the plant.

heartwood: when you cut through the trunk of many trees there will be two distinct wood layers. An outer layer, usually lighter and moister is called sapwood and is newly formed wood with some living cells. Inside this ring of sapwood is often a darker, harder more durable core called heartwood. The most striking example of heartwood and sapwood difference is found in *Dalbergia melanoxylon* which has a light brown sapwood and a purple-black heartwood.

hectare: a measure of land 100 metres by 100 metres, or 10,000 square metres. One hectare is equivalent to 2.47 acres.

hedge: a row of bushes, shrubs or trees planted in a row and trimmed, used to separate one piece of land from another. Species used as a hedge in this book include *Aberia caffra* and *Euphorbia tirucalli*.

Indigenous: an indigenous tree is one which grows naturally within a specific environment or within certain pre-determined boundaries. *Olea africana* and *Salvadora persica* are indigenous in Kenya.

Intercropping growing two or more crops at the same time on the same piece of land. It is quite common to see maize and beans or beans and coffee intercropped in the highlands.

latex: a thick white or whitish liquid produced by certain plants. *Antiaris toxicaria* and *Bridelia micrantha* both have a latex sap. It is not necessarily poisonous, but some types of latex can be harmful, especially if it gets into your eyes. *Euphorbia tirucalli* has a strong latex which should not get on your skin.

legume: any plant of the bean family which produces seed in a thin pod which breaks into 2 pieces along its length. Many legumes fix nitrogen and are good for the soil, but some species do not. Acacia, albizia, *Azelia cuanzensis* and *Cassia siamea* are legumes.

living fence: any row or hedge of live plants used to prevent entry into a certain area by animals or people. *Zizyphus mauritiana*, *Carrisa edulus*, *Aberia caffra* and *Opuntia opuntia* can be used for the purpose.

lopping: a technique used to collect fodder for animals by cutting off side branches, not the main stem. Coppicing involves cutting the main stem. Animals can be allowed to eat the lopped branches at the tree, or they can be carried to the animals as in a zero-grazing system.

mulch: a covering of plant material put on the soil to improve its fertility, moisture retention capacity and organic content. Trees whose leaves make excellent mulch include *Dombeya goetzenii* and *Cordia abyssinica*.

multiple-use: any tree which can be used for more than one or two uses during the course of its life. Most of the trees in this directory are multiple-use trees.

nematode: a class of worms which live in the soil that often become pests of certain crops.

nitrogen-fixing: some plants, especially legumes, have certain types of bacteria which cause nodules to form on their roots. These nodules are red inside when active. The bacteria extracts nitrogen from the air and converts it into a form useable by the plant. In turn the tree provides sugar and moisture through its roots to the bacteria. Nitrogen is an essential element for the production of proteins in a plant. Without it, growth stops. Nitrogen-fixing trees include most acacia, *Leucaena leucocephala* and *Casuarina equisetifolia*.

nutrient-rich: in order for trees or any plants to grow, certain nutrients are required. Among these are nitrogen, potassium, phosphorus, calcium, magnesium, iron, boron and others. A nutrient-rich soil has all these elements and other needed trace elements along with a high organic content. (see mulch).

ornamental: any tree or plant which is planted for its beauty is called an ornamental. This does not mean that it has no other uses. For example, *Chlorophora excelsa* is often planted as an avenue tree along road sides in Uganda. Its stately appearance in no way diminishes its usefulness as a timber. Other ornamentals include *Spathodea nilotica* and *Cassia siamea*.

palatable: having a good or at least tolerable flavour. Some plants, though not poisonous, simply do not taste good and animals avoid them. *Prosopis juliflora* is one type. Other are so highly palatable that it becomes difficult to grow the tree, for example leucaena.

pretreatment: methods of speeding germination for difficult seeds. These are described in some detail in chapter 1.

prick-out: often it is best to sow seeds in one bed and wait until germination occurs before placing them in individual pots. This procedure is called pricking-out. When the newly germinated seed begins to produce its third leaf, one gently loosens the soil around its roots and picks it out, lifting it by the two seed leaves called cotyledons. It is then either placed in water or quickly replanted in an individual pot. This process guarantees one that a seedling will be growing in every pot and is especially important for those species whose seed germinates poorly.

propagate: to increase the number of a given plant type. Most trees propagate themselves by seed. A few produce root-suckers. Others are propagated by cuttings.

resin: a thick sticky liquid that comes out of certain trees and later becomes hard. *Acacia senegal* produces one of the more valuable resins mentioned in this directory, gum arabic.

riverine: along permanent and semi-permanent streams a different environment is created due to the increase in soil moisture. This is termed as a riverine environment.

rootsuckers: some plants, like bananas and date palms, reproduce by sending root-suckers which grow from the mother trees root system. These can be cut away and moved to another site. Other tree will produce root-suckers if its roots are cut some distance from the tree and left exposed. *Ocotea usambarensis* and *Melia volkensii* can be propagated in this fashion.

saline: saline soils are those having a high salt content.

sapling: a young tree, large enough to be above goat height but still immature, not producing fruits.

seed stand: a selected planting of trees, chosen for their good qualities, separated and preserved to use as a seed source for growing trees of the same type.

shrub: small woody plants with multiple stems. Bushes, by contrast, normally have only one main stem. The two words are frequently used interchangeably.

stumps: *Chlorophora excelsa* and some other trees are commonly transplanted as stumps for transport purpose. A stump is simply a young seedling whose stem is cut to about 8cm and roots the same. They are replanted in the same as seedlings.

tannin: Tannin is a type of acid, tannic acid, found in the bark of many trees, most commonly *Acacia seyal*, *Acacia mearnsii* (black wattle) and *Acacia albida*, which is used in the curing of leather.

timber: the wood product of trees obtained by sawing and milling. Timber is a major product of forests. It differs from poles or roundwood only in that it is cut.

transplant: this means to take a tree or plant from one location and plant it in another. Transplanting happens in many forms; seedlings in pots, open-rooted seedlings and stumps, to name but a few.

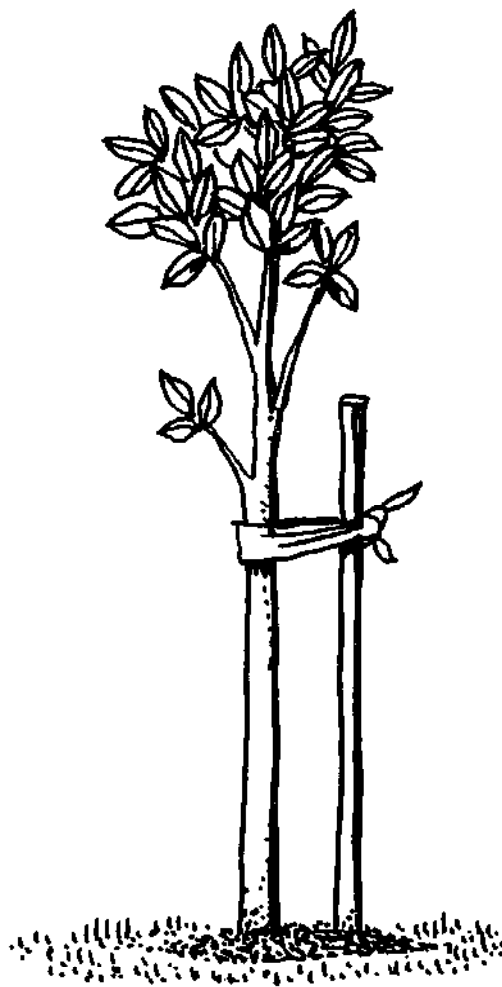
viability: a measure of the potential for seeds to germinate and grow. A seed of short viability will germinate well only within a short time of harvest. Other tree seed have long viability and will germinate readily, possibly with pretreatment, long after collection.

veneer: a product made from round logs of certain trees, like *Polyscias kikuyuensis*, by turning a log and slicing a continuous sheet from it. This sheet is then cut into lengths and glued to rough wood for making peneling, table tops, doors and other products.

wildings: a young seedling which develops in the wild without the help of humans. Often these are the best source of seedlings for some species like *Prunus africanum* or *Olea hochstetteri*.

woods: a woods (or wood) is considered a small grove of trees of mixed species complete with undergrowth. The size is variable.

zero-grazing: a method of keeping animals which involves bringing fodder to them rather than letting the animals graze freely. It is commonly done in the highlands where land is in short supply. Napier grass is a common element in zero-grazing systems. Trees which can be lopped, like *Leucaena leucocephala*, provide an important addition to these systems. So too do trees like *Acacia tortilis* which produces edible pods.



*This book is printed on paper made
from trees grown in Kenya. 1984.*

A Pocket Directory of Trees and Seeds in Kenya was compiled to answer two basic tree-planting questions: which trees are the best to plant in my particular climate type? And where do I get the seeds or seedlings? Ninety tree species are described, along with their best climate types. For each tree species, a list of possible seed sources, locally available, are provided. This book is the first of its kind in Kenya and although it does not presume to answer all the questions raised in the propagation of trees, it will serve as a valuable guide to the complete beginner as well as a useful tool to the already experienced tree-planter.

The author, Wayne Teal, who holds a natural science degree from the Seattle Pacific University (USA) works with the Mennonite Central Committee in Kenya. He has acquired a special knowledge of forest botany during his work in East Africa over several years, and has also developed an advanced approach to rural tree development through his personal concern for the individual problems of people at grass-roots level in the rural area. He is currently working on several rural tree development projects in different parts of Kenya, and helping to develop educational materials that are relevant to them.

The Kenya Energy Non-Governmental Organisation (KENGO) is a coalition of NGOs working on energy resource development and its many applications. As the co-ordinating body, KENGO circulates information and materials relevant to all aspects of energy development, including in particular tree planting, and appropriate fuelwood technology.

KENGO

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