

MEDICINAL PLANTS IN THE IITA FOREST

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Medicinal Plants in Nigeria

Medicinal plants are of vital importance in maintaining health and curing illness in both people and animals throughout Nigeria. About 85% of the population depends on traditional medicine, both of necessity and choice (Okujagu 2006). The high price of pharmaceutical drugs and shortage of trained medical personnel and facilities means that "western" medicine is not an option for most people, whereas traditional healers and herbs are readily available and affordable. Another advantage of traditional medicine, though one which is more difficult to quantify, is that it answers emotional and spiritual needs as well as physical. Those who are ill, suffering or dying need the assurance of the familiar; trust is an important and often overlooked part of the equation. It is a prerequisite of any patient-practitioner relationship and is a particularly important part of traditional medicine, where health and healing are closely connected to family and community.

This is not to say that traditional medicine is a thing of the past. Developments in pharmacology recognize that the complex chemistry of traditional herbal remedies causes fewer side effects and less drug resistance than compounds isolated or synthesized from plants. It is estimated that 300 million people are now infected with malaria parasites and that 2.7 to 3 million of them die each year as a result. Resistance to antimalarial drugs is increasing and resistant strains can have a mortality rate of 15-20%. Combining a pharmaceutical antimalarial with the Chinese herb *Artemisia annua*, which has multiple antimalarial compounds, has been found more effective in eliminating parasites and less likely to cause resistance (Spelman 2009). Most traditional herbalists would not be surprised at this; after all, human beings and beneficial plants have evolved together, resulting in what may be described as metabolic synergy.

Nigeria is a vast and complex country, with over 250 ethnic groups (Okujagu 2006) and a rich and diverse flora which includes over 7300 species of higher plants. It is therefore likely that hundreds of species are used medicinally by traditional practitioners in many different systems of healing. To give just one example, the Ifa divination and



Herb collector, Bode Market, Ibadan

healing system of Yorubaland is an ancient but well-preserved oral tradition (Jegade 2010), both in Nigeria and beyond. Today it is practiced at home and abroad, especially in Latin America and parts of the United States of America where, under the guise of Santería, some 550 herbs are now used in ceremonies and cures (Murphy 1988).

Recording this corpus of indigenous knowledge, which is largely unwritten, is a daunting task, though one that is an avowed aim of Nigeria's National Biodiversity Strategy and Action Plan. It recognizes that sustainable utilization of resources, in terms of medicinal plants, requires "the active collaboration of local communities, traditional healers, ethno-botanists and taxonomists". The aim is to compile a national database of ethno-botanical and ethno-medicinal information as a basis for regulating exploitation of a given species or habitat. The Federal Ministry of Science and Technology, through the parastatal Nigeria Natural Medicine Development Agency (NNMDA) and other key stakeholders, has made a start on documenting the country's medicinal plants. Beginning in 2006, the NNMDA, whose mission is "Promoting Traditional Medicine through Research", published a series of books describing Nigerian medicinal plants according to geopolitical zones. These volumes are the closest yet to a reference work on the subject and could provide the basis for a Nigerian herbal pharmacopoeia i.e. a comprehensive work with more accurate and detailed descriptions of plants, chemical constituents and uses according to ethnic group and region.

Supply and Demand

Though the NNMDA series is a step in the right direction, it gives no indication if a species is indigenous or introduced, little or no information on whether it is common or rare, and no guidelines on sustainable harvesting. As the climate changes and habitats are overexploited and destroyed, these categories are becoming more and more important. There is, after all, little point in describing a medicinal plant and its uses if supplies are no longer available!

The mismatch between supply and demand of medicinal plants was recognized as a serious problem over 20 years ago when the first International Consultation on Conservation of Medicinal Plants by health professionals and plant conservation specialists took place in Chang Mai, Thailand in 1988. The Chang Mai Declaration (see Appendix) called for urgent measures for all countries to halt habitat destruction, erosion of traditional health care systems and unsustainable harvesting practices, whether caused by local pressures and/or commercial interests. This meeting was a milestone that put medicinal plant conservation firmly on the agenda. Certain countries, such as China and India, have subsequently made giant strides in conserving and cultivating medicinal plants and in integrating traditional and modern medicine. However in some countries the situation has worsened, especially in sub-Saharan Africa where the effects of global warming, warfare and rising populations, often compounded by poverty, corruption and poor standards of

education and governance, make it very difficult to implement effective conservation measures. Meanwhile, global demand for medicinal plants rises steadily. Some 3000 plant species are currently in international trade, the majority wild-collected in developing countries (Brinkman and Hughes 2010). This number increases every year as “new” herbs are discovered through unprecedented levels of scientific research into phytomedicines, rising consumer demand for herbal products, and expanding sales through the World Wide web.

Though some of the most widely used medicinal herbs are common roadside plants, many are forest species that depend on a cooler, shadier environment for their survival. Forests have of course always been a resource for local people who hunt and collect edible and medicinal plants, as well as other forest products such as honey, resins, gums, construction materials, fibres and dyes. Ironically, just as we need forests more than ever to mitigate the effects of global warming and conserve biodiversity, deforestation for agriculture, timber, mining and urban expansion mean that these irreplaceable assets are rapidly becoming depleted. This problem is particularly acute in Nigeria which has an extremely high rate of deforestation; less than 10% of the land area is still forested and forests continue to decline at 3.5% per annum. Meanwhile every year the population increases at around 2%.

The IITA-Leventis Foundation Forest Restoration Project

The IITA-Leventis Foundation Forest Restoration Project began in 2010 and the first phase is for four years. It aims to replant forest in land no longer required for experimental crops and to restore degraded areas of existing secondary forest. Before planting began, six experimental areas were set up to record the growth of seedlings under different conditions. Open situations give better results than in the shade where there is competition from other trees and shrubs. During the first phase of reforestation, an area of farmland approximately 60m wide and over 1km long, beside the largest of IITA’s nine lakes, is being replanted. Invasive weeds have also been cleared from open areas along forest trails and planted with trees. Over fifty species of trees have been planted, almost all of which have medicinal uses.

During the first year two nurseries were established to produce trees and other plants from seeds and cuttings collected within the IITA campus at Ibadan and at other forest areas as time and resources permit. Wildlings – self-sown seedlings that occur in places unsuitable for their development – are also a valuable source of nursery stock as by definition they are at least a year older than seedlings of the same species. Detailed records are kept of propagation methods. The nurseries hold stocks of over 33,000 plants belonging to more than 60 species which are for planting on campus and for sale.

In order to assess changes in biodiversity as replanted and restored areas of forest develop, the Project carries out surveys of birds, butterflies and medicinal plants. Sharing the information gained is done on-line as well as through publications and lectures, and by organising educational projects and events for school children in the Ibadan area.

The existing 350-ha secondary forest within the IITA campus has been protected since the late 1960s when IITA developed the Ibadan site as its headquarters but persistent poaching, before and after enclosure, has impacted on populations of wildlife and medicinal plants. Protecting the forest through increased security is now a high priority. The entire forest area has become a conservation area and no hunting or collecting is allowed. Visitors are encouraged, as are recreational activities such as hiking, photography, bird watching and adventure walks for children.

The Project also seeks to partner with other organizations and institutions which utilise the forest's resources for research and educational purposes. There are strong links with, for example, universities and research organisations in the region, the A P Leventis Ornithological Research Institute (APLORI) in Jos, the Butterfly Conservation Society, Ghana, Pro-Natura International, CERCOPAN primate research centre in Calabar, CENRAD in Ibadan and the Nigerian Field Society, resulting in a steady stream of visitors and a succession of PhD students and undergraduates on the Student Industrial Work Experience Scheme (SIWES).

What exactly is a medicinal plant?

Finding out which medicinal plants are present in the forest is the first step to conserving this valuable resource. The definition of a medicinal plant in terms of function is one that has beneficial effects on health, vitality and appearance. Plants are chemical factories powered by the sun and nurtured by the earth, upon which all other living things depend. These chemicals have a huge range of applications in curing disease, healing trauma, relieving pain, spasms and inflammation, calming distress, and preventing infection. Some control parasitic organisms, fungi, bacteria and viruses, while others are astringents that contract tissues, emollients that soothe and protect, and tonics or stimulants that improve functions. Others are pigments or scents that can change appearance and mood; body paints, cosmetics and perfumes are not only important in culture and ritual but can also offer skin protection against insects, parasites and sun. Any medicinal plant can be toxic in excess and it is the skill and experience of the healer to judge effects and side-effects. As the Swiss physician and alchemist Paracelsus (c.1493-1541) wrote: "All substances are poisons; there is none which is not a poison. The right dose differentiates a poison and a remedy."

Medicinal herbs are much harder to define as plants than they are in terms of their uses. They can be any kind of plant, from a mighty forest tree to short-lived annual, and the part of the plant used may differ widely too, from bark and root to leaves, flowers, fruits and seeds, or fluids such as sap and oils. To complicate matters further, a medicinal plant in one region may not be recognized elsewhere, or it may be used in quite different ways. In traditional medicine in parts of Africa, *Prunus africana* is used locally for minor ailments such as stomach ache and poor appetite while as a phytomedicine in Europe it is taken for

prostate problems. The conclusion therefore is that medicinal plants are a cultural phenomenon. They are plants with a human face, defined only by our use of them.

The Checklist of IITA Flora

Any study of medicinal plants must begin with the painstaking process of correct identification. The basis for a checklist of IITA flora was provided by research carried out at IITA in the 1970s by Dr. John Hall and Dr. David Okali (Hall and Okali 1978, 1989), as part of which they prepared an internal report on the vegetation of the two watersheds within the campus. This report includes a list of 327 species identified in an area to the south of the existing IITA forest reserve. To these records I add new records of species as I collect, photograph and identify them. The checklist currently exceeds 425 plant species of which over 380 – about 90% – have medicinal uses recorded in West Africa. It is updated quarterly and can be obtained as an Excel file on request from D.Bown@cgiar.org.

Medicinal Plants and Conservation

Alongside this ongoing survey is the task of assessing which medicinal plants are common. Many are weeds which are abundant and widespread. Then there are those species that used to be quite easy to find but are less common than they were, probably because of habitat destruction and over harvesting. Not surprisingly, many of these are rainforest species, dependent on the shade, shelter, humidity and humus-rich soils which are unique to forests. Assessing the conservation status of these species entails looking at methods of harvesting and the ecology of the plant. Some species immediately ring alarm bells if they are slow growing and destructively harvested i.e. cut down or uprooted, as is the case with many lilies, tuberous aroids, orchids, or stripped of bark or felled, as often quite unnecessarily happens with trees and shrubs. Others are inevitably 'at risk' if they need a pollinator or seed distributor that is now rare or absent. Though not immediately obvious, this means that although there are apparently healthy plants, there are few if any 'new recruits'. In IITA forest the enormous fruits of the African breadfruit, *Treculia africana*, fall to the ground and germinate as a ball of seedlings beneath the parent tree, where they cannot develop, as there are no longer forest elephants to distribute them. Other species that may fail to regenerate in spite of producing viable seed are certain members of the genus *Gardenia* and possibly the related genus *Rothmannia*. They produce hard, extremely durable fruits that stay on the plant unless eaten by herbivores such as elephants or antelopes.

Local demand for medicinal plants is also being researched by communicating with herb traders and collectors. The aim is to plant a demonstration garden and assess whether there are species that could easily and profitably be cultivated in the community. Cultivation in home gardens gives wild populations chance to recover, provides local employment and income, and reduces the risks involved with substitution and/or adulteration which tend to happen when the target species becomes harder to find. And lastly we need to look at methods of wild harvesting so that both plants and people can have sustainable futures.

Medicinal Plants in IITA Forest

As research progresses, the aim is to publish an identification guide to some of the interesting medicinal plants in the IITA forest. The following species are candidates for inclusion.

Alstonia boonei *Apocynaceae* (*awùn*). There are over 40 species of trees and shrubs in this genus, found all over the tropics. Several are important in various parts of the world for two main reasons as the common name 'fever bark' indicates. The bark of these trees is very effective at lowering temperature and in many regions is important for treating malaria. Though slightly less effective than quinine, it is better tolerated and has fewer side effects. It also acts as a painkiller, expels intestinal worms and serves as an antidote to snakebite and poisoning. Like all plants in the *Apocynaceae* family, it contains white latex and needs care when handling as it can cause blindness if it gets in the eyes. Careful removal of small patches of bark does not cause the tree long term damage whereas ringbarking (removing bark right round the trunk) and indiscriminate hacking will weaken and kill tree.

Baphia nitida *Leguminosae-Papilionaceae* (*iyèròsùn*). This small tree, known as camwood, has dark red, heavy wood, used to make drumsticks, mortars and pestles and the spokes of state umbrellas to keep sun and rain from dignitaries. Economically it was once important as a source of red dye. During colonial times it was exported from West Africa to textile mills in Europe where it was ground as a pigment for dyeing wool and preparing cotton and linen for indigo dyeing. Traditionally the powdered heartwood is mixed with shea butter from the savannah tree *Vitellaria paradoxa* to ease joint and muscle pain, and to beautify the skin. It is also important as body paint for ritual purposes and, in Yorubaland, to protect against bee stings when collecting honey. Roots and leaves are also used medicinally to control bleeding and to heal wounds and sores.



Cleistopholis patens (salt-and-oil tree) foliage

Cleistopholis patens *Annonaceae* (*apàkò*). The descriptive name *patens* means 'shining', as in patent leather, referring to the attractive high gloss leaves of young trees, which stand out in the bush as if varnished. This pioneer species is very fast growing, reaching 13m in 7 years, and is being planted at IITA in large numbers, especially in wet ground where it grows especially well. The Yoruba name means 'killing cough' as this tree is invoked in Yoruba incantation to cure coughs. Another common name is salt-and-oil tree as the sap looks like palm oil and tastes salty. The bark and leaves are widely used in traditional medicine, mainly to lower fever and expel intestinal parasites.

Holarrhena floribunda *Apocynaceae* (*iréná*). Commonly known as the false rubber tree, this small ornamental tree occurs in drier forests and regenerating areas, often looking more like a shrub in fallow or abandoned farmland. From February to July, as the new leaves appear, it produces clusters of fragrant white flowers. These are followed by pairs of pencil-thin pods, up to 60cm long, which hang down like beans, splitting open when ripe to release hundreds of seeds that are borne away by tufts of long silky brown hairs. As the name suggests, the false rubber tree yields latex which resembles that of the real West African rubber tree, *Funtumia elastica*, but is inferior. Both bark and leaves contain

alkaloids that are effective in treating amoebic dysentery, diarrhoea and malaria.

Hoslundia opposita *Lamiaceae* (*efinrin*). This spreading shrub bears conspicuous white-stemmed panicles of orange berries. The leaves, though poisonous, are regarded as good for children's illnesses and are an ingredient of the Yoruba *àgbo* pot. This consists of a decoction of various herbs which are simmered in a clay pot. Heating the plant parts reduces toxicity. Usually three igneous pebbles are added to increase potency and food items are sometimes added for palatability, together with the blood of an animal. The herbal concoction is either drunk while warm, bathed in or inhaled while covering the head with a cloth.

Milicia excelsa *Moraceae* (*irókò*). Heavily exploited since colonial times for its fine timber, mature irokos are now a rarity in Nigeria. Attempts have been made to establish plantations but with little success because when young plants are exposed to high light levels and low humidity they are affected by a gall which destroys the growing point. This revered tree is dioecious; male trees bear long catkins and females produce numerous small green sausage-shaped fruits that are relished by bats and widely distributed. The seeds are tiny and very difficult to remove but germinate readily if sown fresh. Iroko bark is used medicinally to treat skin conditions. It has astringent effects and relieves pain and inflammation. Traditional Yoruba healers often add a piece of bark to medicinal preparations to increase efficacy. Iroko timber is sometimes pitted with lumps of crystalline calcium carbonate which are formed from the sap, perhaps as a result of damage to the tree. These are ground to make a cure for headaches. From a distance, iroko can be confused with *Antiaris* (see below).

Antiaris toxicaria subsp. *welwitschii* var. *africana* (or *Antiaris africana* as it is often referred to) *Moraceae* (*akiro* or *oro*). Commonly known as false iroko or bark cloth tree in English, this majestic tree is superficially similar to iroko with very dark green, broadly elliptic leaves. They can be told apart by their bark, which is dark grey-brown and tessellated in iroko and pale and smooth in *Antiaris*. The fruits are also different in appearance, those of *Antiaris* being small, red and velvety, with a single large seed. They attract bats and a range of other animals and birds, so that fruiting trees are often targeted by hunters. The sap of false iroko is very toxic, containing digitalis-like compounds that affect the heart and irritant substances that can cause blistering of the skin. Handling foliage and bark therefore needs care. In spite of its toxicity, false iroko has a range of medicinal uses, especially as a purge for expelling intestinal parasites and in the treatment of leprosy and hepatitis.

Mucuna sloanei *Leguminosae-Papilionaceae* (*ewé-inà*). This vigorous climbing bean has large waxy yellow flowers and ridged pods which are covered with short-cropped hairs. The hairs detach if touched or blown by the breeze, causing both mechanical and chemical irritation to skin, eyes and mucous membranes. If swallowed in sufficient quantity, they can

prove fatal; cases of poisoning by adding hairs to food have been recorded. The seeds are very toxic too, containing various alkaloids, including levodopa (often abbreviated to L-Dopa) which is used in pharmaceutical drugs to treat Parkinson's disease.

Myrianthus arboreus *Cecropiaceae* (*ibisèrè*). There is no mistaking this tree with its enormous digitate leaves that reach 70cm in diameter, with leaflets up to 50cm long and 25cm across. Commonly known as the soup tree, young leaves are an ingredient of a very popular soup in southeast Nigeria. They are also used medicinally to treat dysentery and relieve fever in infants. When in bloom from January to April, the male flowers are conspicuous, being yellow and resembling branches of coral. The female flowers are insignificant but are followed by irregularly shaped chrome yellow fruits, which are 10-12cm across and contain up to 15 large seeds, each enclosed in a polygonal segment. The flesh is edible raw and the seeds, when shelled and cooked, are very nutritious, containing oil, proteins, sugars and significant amounts of cystine, an amino acid which is often deficient in the typical West African diet.

Soup trees are often a gathering place for women with small children. They often grow beside streams and their low branching, multi-stemmed habit makes an ideal playground for adventurous youngsters.

Philenoptera cyanescens syn. *Lonchocarpus cyanescens* *Leguminosae-Papilionaceae* (*èlú*). The Yoruba indigo vine is a large forest liana but if unable to climb because there is no support, it has a more shrubby habit. In cultivation this is an advantage as it is easily harvested. All parts yield indigo dye but usually only leaves and shoots are collected. They are pounded, fermented and dried in balls about 10cm across which are sold in markets to dye fabrics and tint the hair. Yoruba indigo contains indigotin, the same pigment as in Asian indigo (*Indigofera tinctoria*) but in smaller amounts, though this could no doubt be increased through selection. Roots and stems contain compounds with proven anti-arthritis effects. Other traditional uses include the treatment of yaws, leprosy and skin diseases.



Piper guineense (West African pepper) leaves & unripe berries

Piper guineense Piperaceae (iyèré). West African pepper is very similar in constituents to the more familiar pepper, *Piper nigrum*, which has been traded from Asia since ancient times as a condiment and food preservative. Pepper also has medicinal uses, improving digestion and relieving bronchial congestion. The seeds of West African pepper are used in exactly the same ways as Asian pepper and the mild peppery leaves are added to soups and stews. The roots can be harvested as chew sticks, which are apparently popular in the Ibadan area. Vines climb quite high into the forest canopy before flowering and fruiting take place, and are often destructively harvested by pulling down the whole plant. In colonial times there were plantations of West African pepper along the coast and the King of Portugal had a monopoly over the trade. In a bid to popularize the product, he claimed it was twice as strong as Asian pepper. Unfortunately he also tried to charge twice as much, after which the trade went downhill.

Pterocarpus osun Leguminosae-Papilionaceae (osùn). This tree reaches 30m high and is a fine sight from August to November, with upright panicles of scented yellow flowers, followed by papery disc-shaped fruits up to 15cm across, which are the largest in the genus. This is not a regular occurrence as this species has what are known as mast years, which means that it produces abundant flowers and fruits only once every few years. Another remarkable feature is the bright red sap which is used as fake blood in painting ju-ju figures.

The heartwood contains an intense red pigment which is used in traditional African cosmetics and in more recent times as a stain in microscopy. The ground leaves are used to make the traditional black soap, *dudu osùn*, and the twigs are ingredient in Nicosan, a Nigerian herbal remedy created by the Rev. P.O. Ogunyale, which has been clinically tested and approved for the treatment of sickle cell anaemia (Nathan et al. 2009). This phytomedicine also contains seeds of West African pepper (*Piper guineense*), *Sorghum bicolor* leaves and cloves (*Syzygium aromaticum*).

Pycnanthus angolensis *Myristicaceae* (*àkomu*). African nutmeg is a fast-growing evergreen tree, related to true nutmeg (*Myristica fragrans*) which originated in the Indonesian Molucca Islands. The fruits are similar in appearance but smaller and less aromatic, splitting open when ripe to reveal a glossy brown seed inside a red aril. Their main importance is as a source of bitter, solid yellow vegetable fat which is used for making soap and candles. The seeds are so rich in oil that traditionally they were threaded and burnt as a hanging candle. They are also used medicinally to make a mouthwash for thrush and mouth ulcers, and ointments for skin diseases and joint problems.

Rauvolfia vomitoria *Apocynaceae* (*asoféyeje*). This small shrubby understory tree produces tiny fragrant white flowers and clusters of bright red berries. Traditionally used to treat mental and nervous disorders and snakebite, it is also now grown commercially in some parts of West Africa for the pharmaceutical industry as a source of alkaloids. The main constituents are reserpine and ajmaline which are used in psychiatric drugs and in medication to lower blood pressure. Originally in the medicinal plant trade these alkaloids were obtained from the Asian species, *R. serpentina*, a much smaller plant that was simply pulled up by collectors, becoming so scarce that in 1997 it was protected by international legislation and India banned its export. Collectors then turned to its African relative, *R. vomitoria*, which in turn is now endangered in Ghana. Though too large to uproot easily, this species also suffers from destructive harvesting. As alkaloids are most plentiful in the bark of stems and roots, plants are often cut down or damaged so severely that they die or take many years to recover.

Solenostemon monostachys, subsp. *monostachyus* *Lamiaceae* (*ironòpòlò, arànpòlò*). The Yoruba name means 'generation of frogs', presumably because it grows along forest trails in damp places where frogs are likely to jump out. This annual plant of the mint family is a household remedy. It is often added to the Yoruba agbo pot to treat common minor ailments, especially in children. The whole plant, sap or leaf juice is used. The leaves are also eaten as a vegetable and it is sometimes cultivated for this purpose. Even the cooking water has medicinal uses to treat parasitic foot infections.

Sphenocentrum jolleyanum Menispermaceae (*àjò*). This small understory shrub grows in deep shade in the forest. It has irregularly lobed leaves, minute flowers along the stems and clusters of bright orange, egg-shaped fruits with seeds surrounded by a slimy gum which was once used by school children as an adhesive for gluing paper. The fruits are refreshing to suck when trekking through the forest and suffering from fatigue. They are also made into a cough medicine with lemon juice and fruits of West African pepper (*Piper guineense*). It is *àjò* root and bark that has the most potent medicinal uses though, treating high blood pressure, breast tumours, tropical ulcers, and bleeding, but perhaps best known as an aphrodisiac for men. Chemical analysis of this plant and research into its effects show that it does indeed have potential as an African Viagra. It is also an effective anti-inflammatory.



Picking fruits of *Sphenocentrum jolleyanum*



Strophanthus hispidus, arrow poison plant in IITA forest

Strophanthus hispidus Apocynaceae (isàgèrè). This liana is the archetypal arrow poison plant of West Africa, containing glycosides that stop the heart more or less instantly. It was often planted in villages to have at hand for hunting and pruned as a shrub to give easy access to the fruits and their highly toxic seeds. Other parts, including juice, leaves, stems and root bark, are used specifically for syphilis and more widely for many other problems, from snake bite to intestinal parasites and head lice. Interestingly, research has also shown that leaf extracts control blood clotting in internal haemorrhage caused by the venom of certain snakes, so this is one cure for snake bite that might actually work. Both leaf and root extracts also have antibacterial effects, controlling *E-coli* and *Staphylococcus* infections. This is one of four *Strophanthus* species recorded in IITA forest, including *S. gratus* which has potential in the treatment of prostate cancer, and *S. hispidus*, a source of cardiac glycosides in the pharmaceutical industry.

Tapinanthus heteromorphus Loranthaceae (âfômó). *Tapinanthus* is the largest genus of mistletoes in West Africa. These evergreen parasitic shrubs grow on various kinds of trees and are inconspicuous unless flowering, or unless the host is deciduous. In European herbal medicine, mistletoe is used mainly in the treatment of nervous complaints and certain cancers, but in African tradition the uses are dictated by the kind of host plant, even though only the mistletoe is used. When growing on *Vitex doniana* for example, mistletoe is a



Tapinanthus sp. (mistletoe)

remedy for leprosy, but when on a baobab it is used for mental illness, while various other hosts confer protection against sorcery, evil spirits etc. In Senegal especially, mistletoe from various hosts is used in agriculture to protect crops and increase yields. It is an adaptable plant; at IITA we have mistletoe on the invasive alien weed *Leucaena leucocephala* which may weaken it physiologically and certainly breaks an occasional tree with its weight.

Thaumatococcus daniellii Marantaceae (eèran). Yoruba soft cane is a forest understorey plant that forms conspicuous large clumps over 2m high. Much less noticeable are the fruits which are borne at ground level and remain cryptically brown until fully ripe, when they turn bright scarlet. Plants are propagated mainly by division and are often cultivated in cola plantations where it is handy for wrapping cola nuts for market. The leaves are in fact a commodity in themselves, sold in bundles to wrap food items before cooking, to which they impart a pleasant flavor. The fruits contain three seeds which are not edible but are surrounded by an edible jelly. This substance is intensely sweet but has zero calories, so is enjoyed for its flavor rather than for nutritional reasons. It can be used to sweeten foods and drinks and has the effect of making anything else tastes sweet for some time afterwards. The sweetness comes from gel-like proteins which in a raw state are 2-3000 times sweeter

than sugar and when purified are 11,000 times sweeter. These proteins are therefore the sweetest known substance, natural or synthetic, and are of considerable interest to the food industry.

Treculia africana Moraceae (*afon*). African breadfruits are unmistakable, resembling vegetable footballs about 30cm in diameter and 10kg in weight. This tree, which reaches over 25m high, occurs in drier tropical forests but usually near water, such as the banks of streams. It is sometimes cultivated or protected in villages both for its fruits and because it apparently causes "dew" – perhaps secretion of water from the leaves, technically called guttation - which keeps the ground moist. The bark and roots are ingredients in the Yoruba *agbo* pot to treat worms in children. Ground bark is also mixed with oil as a tonic body rub after illness. The fruits are edible but not very palatable and are valued mainly for their nutritious seeds. To extract the seeds, which are embedded throughout the flesh, fruits are left to rot and then soaked in water. The seeds are an important commodity in some areas, eaten raw, roasted or fried and also pounded to make a nutritious thickener for soups and stews.

Voacanga africana Apocynaceae (*ako-dòdo*). This small understory tree has fibrous bark and white sap. Various parts are used in traditional medicine as a dressing for skin problems, such as eczema, boils, sores and scabies. Extracts are also taken internally to treat angina, kidney problems, hernia, gonorrhoea, convulsions and psychiatric disorders, and the latex is applied to tooth decay. In common with many species in the Apocynaceae family, *Voacanga* contains many different alkaloids with a wide range of medicinal applications, notably as a cerebral stimulant and cardio-tonic (Brendler et al. 2010). Some 1600 tons of seeds are exported from Ghana and Côte d'Ivoire annually, mainly to France and Germany where they are processed by the pharmaceutical industry. Research indicates that *Voacanga* has antifungal, antimicrobial and antioxidant effects which are utilized in drugs to treat debilitating illnesses such as gastric ulcers, amoebic dysentery and AIDS. One of the alkaloids, ibogaine, reduces withdrawal symptoms and cravings in alcoholics and drug addicts. The fruits are collected from the wild, often unsustainably, by cutting down trees (Koroch et al. 2009) though Cameroon started plantations and enrichment plantings in the early 1990s.

Conclusion

In 1988 the Chang Mai Declaration marked a turning point in our perception of medicinal plants as a free and apparently inexhaustible resource. Most countries now have the conservation of indigenous medicinal plants on their agenda, alongside the cultivation of those which are under threat or in great demand, especially for export. In addition to the obvious benefits of ensuring a sustainable supply of essential medicines, these strategies ensure the vitality of traditional health care systems and take the pressure off wild places to provide all the raw materials. By definition they also involve greater co-operation and

communication between all those involved in the medicinal plant supply chain i.e. growers, collectors, market traders, traditional practitioners, consumers and exporters. The net result is that there are more opportunities for leadership, training, employment and wealth creation, which form the basis of thriving communities. Standards of collection, cultivation and processing also improve, bringing more consistent information, codes of practice and better quality products which in turn give better healthcare delivery and more responsible environmental management. Nigeria, the giant of Africa and potentially the most influential country of the continent, needs many initiatives at federal, state, regional and community level to prevent further loss of forests and irreplaceable resources such as medicinal plants. The IITA-Leventis Foundation Reforestation Project is one small cog among many that have started to turn a much larger wheel of change.

References

- Arbonnier, M., 2004. *Trees, shrubs and lianas of West African dry zones*. MARGRAF Publishers, The Netherlands.
- Bown, D., 1995, 2002. *The Royal Horticultural Society/Herb Society of America Encyclopedia of Herbs and Their Uses*. Dorling Kindersley, London and New York.
- Brendler, T., Eloff, J.N., Gurib-Fakim, A., and Phillips, L.D., 2010. *African Herbal Pharmacopoeia*. Graphic Press, Mauritius.
- Brinkman, J. and Hughes, K., 2010. *Ethical Trading and Fair Trade Certification: the growing market for botanicals with ecological and social certification*. Herbalgram 88: 46-57.
- Burkill, H.M., 1985. *The Useful Plants of Tropical West Africa*. Royal Botanic Gardens, Kew.
- Cunningham, A.B. 1993. *African Medicinal Plants: setting priorities at the interface between conservation and primary healthcare*. UNESCO, Paris.
- Hall, J.B. and Okali, D.U.U., 1978. Observer-bias in a floristic survey of complex tropical vegetation. *Journal of Ecology* 66:241-249.
- Hall, J.B. and Okali, D.U.U., 1979. A structural and floristic analysis of woody fallow vegetation near Ibadan, Nigeria. *Journal of Ecology* 67:321-346.
- Hepper, F.N. (Ed.), 1963/1968. *Flora of West Tropical Africa*. Royal Botanic Garden, Kew.

- Jegade, O., 2010. *Incantations and Herbal Cures in Ifa Divination: emerging issues in indigenous knowledge*. Bookbuilders, Ibadan.
- Keay, R.W.J., Onochie, C.F.A. and Stanfield, D.P., 1964. *Nigerian Trees*. Department of Forest Research, Ibadan.
- Koroch A.R., Rodolfo Juliani, H., Kulakowski, D., Arthur, H., Asante-Dartey, J., and Simon, J.E., 2009. *Voacanga africana*: Chemistry, Quality and Pharmacological Activity. In: Rodolfo Juliani, H., Simon, J.E. and Ho, C-T (eds.). *African Natural Plant Products: New Discoveries and Challenges in Chemistry and Quality*. American Chemical Society, Washington D.C.
- Murphy, J.M. 1988. *Santería: An African Religion in America*. Beacon Press, Boston.
- Nathan, S., Tripathi, P., Wu, Q., and Belanger, F., 2009. Nicosan: Phytomedicinal Treatment for Sickle Cell Disease. In: Rodolfo Juliani, H., Simon, J.E. and Ho, C-T (eds.). *African Natural Plant Products: New Discoveries and Challenges in Chemistry and Quality*. American Chemical Society, Washington DC.
- Okujagu, T. F. et al., 2006/2009. *Medicinal Plants of Nigeria* Vol. 1. Nigeria Natural Medicine Development Agency, Federal Ministry of Science and Technology, Lagos.
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APPENDIX:

The Chang Mai Declaration
Saving Lives by Saving Plants

We, the health care professionals and the plant conservation specialists who have come together for the first time at the WHO/IUCN/WWF International Consultation on Conservation of Medicinal Plants, held in Chang Mai, 21-26 March 1988:

Recognise that medicinal plants are essential in primary health care, both in self-medication and in national services;

Are alarmed at the consequences of loss of plant diversity around the world;

View with grave concern the fact that many of the plants that provide traditional and modern drugs are threatened;

Draw attention of the United Nations, its agencies and member States, other international agencies and their members and non-governmental organizations to:

- The vital importance of medicinal plants in health care;
- The increasing and unacceptable loss of these medicinal plants due to habitat destruction and unsustainable harvesting practices;
- The fact that plant resources in one country are often of critical importance to other countries;
- The significant economic value of medicinal plants used today and the great potential of the plant kingdom to provide new drugs;
- The continuing disruption and loss of indigenous cultures, which often hold the key to finding new medicinal plants that may benefit the global community;
- The urgent need for international cooperation and coordination to establish programmes for conservation of medicinal plants to ensure that adequate quantities are available for future generations.

We, the members of the Chang Mai International Consultation, hereby call upon all people to commit themselves to Save the Plants that Save Lives.