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ETHNOBOTANY OF SOME SELECTED MEDICINAL PLANTS

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Introduction

Access to healthcare facilities in Ghana is very poor as one medical doctor is to more than 6,000 people (Africapedia, 2007), with majority of them practicing in the two largest cities of Accra and Kumasi. According to Gbile (1988) about 80% of the population in Africa uses plant medicine partly due to poverty and insufficient number of medical professionals. Medicinal plants therefore play an important role in our healthcare delivery but over-reliance on wild collections results in dwindling of the resource. The current rate of forest degradation, intensive exploitation and utilization of the various medicinal plants across the West African sub region pose serious threats to the continued availability of these invaluable forest resources.

Indigenous knowledge on the utilization and conservation of these species are being lost as the old custodians of the knowledge pass away. Also, parts of the plants often harvested are those used for anchorage, nutrient uptake, photosynthesis and regeneration by the plants. These threaten the plants natural regeneration, vigorous stand development and continuous existence of the species in natural ecosystem. There is therefore the need for deliberate and concerted efforts to develop appropriate conservation and sustainable management strategies for threatened or endangered medicinal plant species. The selected species were identified through a major study that involved a comparative analysis on utilization and availability of medicinal plants in Ghana (Ofori *et al.*, 2010).

This handbook therefore describes ten threatened or endangered medicinal plant species in relation to the species identity, ecology and distribution, uses, reproduction and propagation methods for efficient conservation.

Objectives of Study

The main objective of the study was to identify ten threatened/endangered medicinal plant species in Ghana and develop methods for their propagation and conservation. The specific objectives were:

1. Documentation of indigenous information (formal and informal) on the ten selected threatened/endangered medicinal plants through ethno-botanical studies.
2. Assess their distribution, relative abundance and study the phenology of the ten selected species.
3. Develop appropriate methods for seed germination and rapid multiplication of their germplasms through vegetative propagation by cuttings.
4. Conserve the germplasms of the ten selected medicinal plants in live gene banks using ex-situ conservation approaches.

Methodology

The study was structured to cover a socio-economic survey, ecological survey, phenology, propagation and germplasm conservation.

Socio-economic Survey

The socio-economic survey covered eight regions (Western, Eastern, Ashanti, Brong Ahafo, Volta, Greater Accra, Central and Northern Regions) spanning across 4 of the 5 major ecological zones of Ghana, i.e. Wet Evergreen Forest, Moist semi-deciduous Forest S/E and N/W, Forest-Savannah Transition and Coastal Savannah.

Data on sources of supply, uses and availability were collected from 3 major groups of respondents i.e. medicinal plant suppliers, marketers and traditional medicine practitioners in one on one interviews.

Distribution and Relative Abundance

Based on the socio-economic survey, ten medicinal plants were selected based on their importance, vulnerability and occurrence. The distribution and abundance of these medicinal plant species were studied. This involved the setting up of sample quadrats in selected communities where the socio-economic study pointed out as their origin. These included Pra Anum in the Moist semi-deciduous forest, Winneba in the Southern marginal forest, Sunyani

forest District in the Dry semi-deciduous forest, Kintampo district in the forest-savannah transition zone and Tamale district in the Guinea savannah woodland (Figure 1).

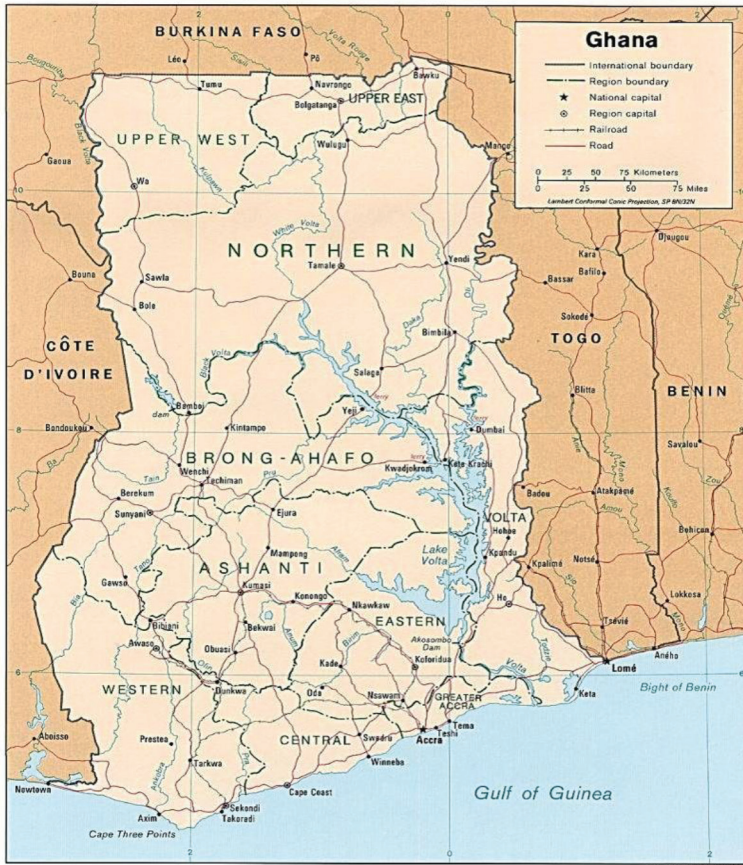


Figure 1: Map of Ghana showing the sample sites marked with rectangles (Red = savannah woodland site near Tamale; Blue = derived savannah near Kintampo; light green= Dry semi-deciduous forests near Sunyani; leaf green = Moist semi-deciduous forest at Pra Anum; Orange = Southern marginal forest near Winneba).

The target population was the medicinal plants found within sample plots. The quadrats were randomly located within different ecosystem units within each ecological zone. Using the plot size of 20 x 50 metres all plants of 5 cm diameter and greater were recorded and in sub-plots of 10 x 5 m seedlings (below 1 m height) and saplings (> 1 metre high and < 5 cm diameter) were also recorded. Data collected included the frequency and distribution of target medicinal plant species and the threats to their survival in the various vegetation and land use

areas. The land use areas sampled constituted forest reserves, sacred grooves, and farmlands.

Phenology Morphology and Propagation Studies

The morphology and phenology of the species were studied. Seeds were also collected from trees in at least two different populations/ecological zones. Seeds were extracted, germinated and seedlings raised for establishment of ex-situ conservation plots. Vegetative propagation using stem cuttings was also studied. Cuttings were collected from coppiced shoots and/or seedlings for species from which no seeds were obtained or seedlings were in small quantities (*Securidaca longepedunculata*, *Xanthoxylum xanthoxyloides*, *Vitellaria paradoxa*). For these species cuttings were taken from branchlets on top of the trees. The cuttings were of 6 cm long with 25 cm² pieces of leaves retained on them.

The bases of the cuttings were applied with 0.25% Indole 3-butyric acid (auxin) and the rooting ability was compared with the control (no rooting hormone).

Germplasm Conservation

Two gene conservation plots (0.5 ha each) were set up; one in moist semi-deciduous and another in dry semi-deciduous forest zones using eight of the selected species. *S. longepedunculata* and *Z. xanthoxyloides* could not be planted since neither seedlings nor cuttings could be produced. For each site 25 seedlings per species per two different populations were planted. Planting distance was 2.5 m x 2.5 m. Ten seedlings per each species were also planted in the arboretum at Bunso managed by the CSIR-Plant Genetic Resources Research Institute. Information dissemination was undertaken through working with herbal practitioners, Millennium Development Project, students, seminars and radio broadcast.

Ethnobotanical Information on the Species Studied

Kigelia africana



Species Identity

Family: Bignoniaceae

Common Name: Sausage Tree

Vernacular names: Nufutene, Nana beretee, Etua, Nyakpe (Ghana); Pandoro (Nigeria)

Botanical Description

Kigelia africana grows up to 17 m high.

Leaves are compound, pinnate with 7-11 leaflets. The leaves are usually opposite or in whorls of three.

Flowers are pendulous, greenish outside and reddish brown within. The flowers and fruits hang down from branches on long flexible stems

Fruits are up to 0.60 m long containing numerous seeds (Irvine, 1961).

Ecology and Distribution

It occurs throughout humid tropical Africa. It is mostly found in the transition and dry semi-deciduous forests.

It is native of Gambia, Sierra Leone, Ghana, Togo, Benin and Nigeria (Irvine, 1961).

Threats

The use of the fruits, roots and bark for medicinal purposes is a potential threat if measures are not put in place for regeneration of the plant.

Uses

Medicine: In Ghana the fruits are used for treating piles, constipation and in- fertility. The root is for constipation and for tapeworm.

The roots and fruit are for waist pain and sexual weakness. The bark is used as a remedy for rheumatism, dysentery and wounds.

Reproduction

In Ghana it flowers between January and March and fruits between May and July.

Propagation Methods

Seed germination

Sowing medium: River sand.

Start of germination: 9 days after sowing. Germination period: 28 days.

Percentage germination: An average of 40%.

Rooting of cuttings

Rooting medium: unwashed river sand

Leaf number and area: 1 or 2 and about 40 cm²

Cutting length: 2 to 3 nodes

Number of weeks before rooting starts (with hormones): 2 weeks. Rooting success (with hormones): 100% after 3 weeks. Rooting success (without hormones): 100% after 3 weeks.

Securidaca longepedunculata



Species Identity

Family: Polygalaceae

Scientific Name: *Securidaca longepedunculata*

Vernacular Names: Kyiritoo, Aforo, Kpaliga, Kpelgy, Pɛla (Ghana)

Botanical Description

Securidaca longepedunculata is a shrub and grows up to 12 m high. It has a thick bark as well as thick roots. It is spiny, much branched, with an open rather straggly looking crown. Leaves are alternate or clustered on dwarf lateral branchlets. Leaves are simple, variable in size (1-5 x 0.5-2 cm) in shape, oblong lanceolate, dark green with rounded apex. Flowers are reddish purple and sweet scented. Its fruits have distinctive membranous wing that are up to about 40mm that are large and flat with only one seed in them (Irvine, 1961).

Ecology and Distribution

It is found mostly in savannah areas where soils are sandy or rocky because it is a good resistant to fire and sensitive to frost. Some can also be found in forest fringes.

It is native of Senegal, Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Togo, Benin, Angola, Benin, Burundi, Chad, Cameroon, Botswana, Dr Congo, Rwanda, Sudan, Niger, Zambia, Zimbabwe, South Africa and Tanzania (Irvine, 1961).

Reproduction

The flowers start to appear in May.

Fruits often hang on trees for many months and those that stay the longest are said to germinate best.

Threat

Its medicinal use is high in demand as bark is always removed.

Uses

Wood: The wood is used for poles, firewood, charcoal, bows and arrows.

Food: The seeds and flowers are rich in oil.

Medicine: The roots are used to treat gonorrhoea and syphilis. They are also used to treat malaria, sleeping sickness, chest complaints, sleeping sickness, toothache, wound dressing, cough and snake bite. The seeds are for rheumatic pains, headaches and feverish pains.

Morinda lucida



Species Identity

Family: Rubiaceae

Common name: Brimstone Tree

Vernacular names: Konkroma, (Ghana), Oruwo (Nigeria)

Botanical Description

Morinda lucida often grows up to 17 m high with a dense crown from its slender branches. Matured leaves are about 20×13 cm which is broadly elliptic to broadly ovate, acuminate and entire.

Flowers are white and fragrant (Irvine, 1961).

Fruit head is lobed, about 1.5 cm in diameter and green when immature turning brown to black when mature.

Ecology and Distribution

It is found in most forest types e.g. forest fringes and flooded areas. It is native of Cote d'Ivoire, Ghana, Benin, Nigeria, Angola, Congo, and Sudan (Irvine, 1961).

Threat

The plant is harvested for timber.

Uses

Wood: The wood is used for furniture, thatch houses, poles, canoes and firewood. It is also used for red, yellow and green dyes.

Food: Fruits are eaten by hawks and moths, and also for seasoning drinks.

Medicine: Root, bark and leaves are used to treat malaria, typhoid fever, gonorrhoea, bone fracture, rheumatism, high blood pressure as well as candidiasis in female.

Reproduction

It flowers from January to July as well as September to October.

Propagation Methods

Seed germination

Sowing medium: River sand.

Start of germination: 29 days after sowing. Germination period: 90 days.

Percentage germination: An average of 65%.

Rooting of cuttings

Rooting medium: Unwashed sand

Stock plant: coppice shoot

Leaf number and area: one or two and 40 cm²

Cutting length: 2 to 3 nodes

Number of weeks before rooting starts (with hormones): 4 weeks
Number of weeks before rooting starts (without hormones): 4 weeks

Rooting success (with hormones): 70% after 4 weeks. Rooting success (without hormones): 45% after 4 weeks.

Pycnanthus angolensis



Species Identity

Family: Myristicaceae

Common Name: African nutmeg

Vernacular Name: Otie (Ghana)

Botanical Description

Pycnanthus angolensis grows up to 40 m high and 5 m in girth. The tree has a straight bole with no buttresses. Crown is flat, branching at right angles to stem and in whorls.

Leaves are up to 18 × 6 cm, acuminate and riddled with holes. Flowers are in panicles without petals, with male and female flowers at separate parts of the same tree.

Fruits are abundant and oblong up to 3.8 cm. The shell of the fruit is hard and thick enclosing a single oval nut, scarlet when fresh and later brownish black (Irvine, 1961).

Ecology and Distribution

It is mainly found in semi-deciduous and evergreen secondary forest in a more dispersed manner. It does not colonize in numbers but survives in singles in forest gaps and clearings.

It is a native of Guinea, Ghana, Angola, Mali, Mauritania, Nigeria, Senegal, Tanzania, Togo, Gabon, Chad, Congo, Benin, Burkina Faso, Uganda etc. (Irvine, 1961).

Threat

It is classified as a major timber tree. Increased exploitation is therefore likely to affect seed production and natural regeneration.

Uses

Wood: Roofing shingles, canoes, beds, house walls, door and window frames. It is suitable for plywood, veneers cheap furniture, boxes and packing cases or even paper pulp.

Medicine: The bark, the leaves and seeds are used to treat anemia, stomach and menstrual disorders, tooth ache and as a blood tonic.

Reproduction

In Ghana flowering is from October to May and fruiting is from September to April.

Propagation Methods

Seed germination

Sowing medium: River sand.

Start of germination: Between 26 to 29 days. Germination period: 60 days.

Germination percentage: An average of 64% of fruits which have not been kept for more than 10 days after harvesting.

Rooting of cuttings

Rooting medium: unwashed river sand. Plant part: six month old seedlings.

Leaf number and area: one or two and 40 cm².

Cutting length: 2 or 3 nodes.

Rooting success (with hormones): 25% after 23 weeks. Rooting success (without hormones): 15% after 23 weeks.

Alstonia boonei



Species Identity

Family: Apocynaceae

Scientific Names: *Alstonia boonei*

Vernacular Names: Osen nuru, Onyame dua, Bakunin,
Nyamelele Baka, Siaketekre. (Ghana)

Botanical Description

Alstonia boonei is a large tree that grows up to 37 m high and 3 m in girth with a tall clear bole and with high narrow buttresses. There are 4 to 7 leaves found at each node with matured ones growing to about 25 × 8 cm (Irvine, 1961).

Ecology and Distribution

It is found in deciduous forest, partial to swampy land and also in fringing forest. Found in dry, peripheral, semi evergreen, Guinea- Congolian forest and transitional forest. It is native of Gambia, Mali, Congo, Sudan, Ghana, and Guinea, Guinea Bissau, Ethiopia, Equatorial Guinea, Senegal, Sierra Leone and Uganda, Togo, Benin, etc. (Irvine, 1961).

Threat

The plant is classified as a major timber tree. Increased exploitation is likely to affect seed production and natural regeneration.

Uses

Wood: The wood is used for boxes, veneer, moulding and matches. It is also used for wooden shoes, carving images, drums, canoes, devil masks plates, spoons, stools, bowls, and basins.

Medicine: In Ghana the bark and leaves are used to treat malaria, stomach disorders, measles, waist and body pains, hernia and as a blood tonic.

Reproduction

In Ghana flowering is in October and November. Flowers are small and white. Fruits come in pairs with long thin follicles up to 46 cm. Fruits mature in January and February.

Propagation Methods

Seed germination

Germination medium: River sand. Start of germination: 10 days. Germination period: 40 days. Percentage germination: 66%. *Rooting of Cuttings*

Rooting medium: Unwashed river sand. Plant part: coppice shoot

Leaf number and area: One or two and 40 cm².

Cutting length: 2 - 3 nodes.

Number of weeks before rooting starts (with hormones): 7 weeks
Number of weeks before rooting starts (without hormones): 7 weeks

Rooting success (with hormones): 65% after 12 weeks

Rooting success (without hormones): 50% after 12 weeks

Khaya senegalensis



Species Identity

Family: Meliaceae

Scientific Name: *Khaya senegalensis*

Common Name: Mahogany

Vernacular Name: Kuka (Ghana)

Botanical Description

The tree grows up to a height of about 15-20 m in savanna areas and in fertile and deep soils reaching 34 m high and 3 m in girth. It divides from 6 m into 2 or 3 large limbs giving it a wider crown. The bark is grey in colour and very scaly. The leaves are compound, pinnate, leaflet 4 to 6 pairs. (Irvine, 1961)

Ecology and Distribution

It is found in Savannah zone. It is common in Senegal, Gambia, Ghana, Togo, Benin, Nigeria, Mali, northern Cameroon, southern Sudan and Uganda (Irvine, 1961).

Threat

The bark of the trunk is usually removed for medicinal purposes exposing the trees to pathogens.

Uses

Wood: It is used for furniture, railway carriages, construction, interior decoration, and veneer. Bark yields a brown dye.

Leaves: As fodder for feeding cattle. The ash is used as a preservative for millet seeds.

Medicine: The root and bark are used in Ghana for treating fever, menstrual disorders, gastric pains, stomach ache, syphilis, leprosy, allergies, jaundice, dermatitis, chicken pox, tape worms, inflammation of the gum and diarrhoea.

In animals it is used to treat liver fluke in cattle, ulcer and other internal ailment in horses, camels and donkeys.

Reproduction

It flowers between February and March. Fruits mature from December to January.

Propagation Methods

Seed germination

Sowing medium: River sand.

Start of germination: 7 to 9 days after sowing. Germination period: 42 days.

Percentage germination: An average of 74%

Rooting of Cuttings

Rooting medium: unwashed river sand. Plant part: six month old seedlings.

Leaf number and area: One or two and 40 cm².

Cutting lengths: 2 to 3 nodes.

Number of weeks before rooting starts (with hormone): 3 weeks
Number of weeks before rooting starts (without hormone): 5 weeks
Rooting success (with hormone): 100% after 10 weeks

Rooting success (without hormone): 70% after 10 weeks

Rauwolfia vomitoria



Species Identity

Family: Apocynaceae

Scientific Name: *Rauwolfia vomitoria*

Vernacular Name: Kakapenpen, Bakaembe, Dodemkpowoe (Ghana)

Botanical Description

It is a shrub that grows up to 7 m high; leaves 18 cm × 8cm, narrowly ovate, acutely acuminate.

Flowers are in whorls 3-4 at a node, white and numerous. Fruits are solitary or pair, scarlet and spherical containing large seeds (Irvine, 1961).

Ecology and Distribution

It is common in secondary forests of both moist and dry semi- deciduous forest. It is native of Senegal, Liberia, Ghana Togo, Benin, Congo, Uganda, Sudan and East Africa (Irvine, 1961).

Threats

Exploitation of barks, roots leaves and seeds for medicinal purposes is likely to affect natural regeneration.

Uses

Medicine: The bark, roots, leaves and seeds are used for medicine. It is used for jaundice and gastrointestinal conditions and for convulsions. The decoction is used as a sedative for madness which induces several hours of sleep. The macerated root is used with guinea-grains in gin as aphrodisiac. The powdered roots are applied to snake bite. The roots are used for urethral discharge and treating of gonorrhoea. It is administered to persons poisoned through food to induce vomiting. It is prescribed for swollen feet, yaws on the skin, hernia, bone dislocation and rheumatism.

Reproduction

Rauwolfia vomitoria flowers from February to April. Fruits mature from May to July.

Propagation Methods

Seed germination

Sowing media: River sand

Start of germination: 54 days.

Germination period: 90 days. Percentage germination: 60% *Rooting of cuttings*

Rooting medium: unwashed river sand

Leaf number and area: One or two and 40 cm²

Cutting length: 2 or 3 nodes

Number of weeks before rooting starts (with hormones): 4 weeks

Number of weeks before rooting starts (without hormones): 4 weeks.

Rooting success (with hormones): 95% Rooting success (without hormones): 80%

Tamarindus indica



Species Identity

Family: Caesalpiniaceae

Scientific Name: *Tamarindus indica*

Vernacular Name: Oson, Taamerese, Blofo Yoyiteo, Puro,
Yeut-sitoe, Puhuga (Ghana)

Botanical Description

Tamarindus indica is an evergreen tree that grows up to a height of about 30 m and about 2 m in diameter. It has a dense crown and compound leaves which are pinnate. Leaflets are 12-15 pairs, unusually round at the base.

Flowers are yellowish with red stripes in small terminal racemes. Fruits are oblong pods about 5-10 cm long and 2 cm wide. A pod contains 1-10 seed surrounded by sweet edible substance, generally riddled with insects (Irvine, 1961).

Ecology and Distribution

It is found in the Savannah zones of Ghana and belts around the Volta River in Ghana.

Tamarindus is widely distributed in the tropics, probably originally native of Africa and other continents (Irvine, 1961).

Threat

The fruits are harvested and processed into drinks. All such seeds are destroyed during processing, reducing seed availability for natural regeneration.

Uses

Medicine: In Ghana it is used for dressing circumcision cuts and other wounds. It is drunk by women after childbirth which is good for bronchitis and as a laxative. It is also used in treating boils, pimples, jaundice, diarrhea, dysentery, rheumatism, etc.

Reproduction

Tamarindus flowers from January up to April. It fruits in March, July and December.

Propagation Methods

Seed germination

Germination medium: River sand.

Start of germination: 10 days after sowing. Germination period: 40 days.

Percentage germination: 66%.

Rooting of Cuttings

Rooting medium: Unwashed river sand.

Plant part: coppice shoot

Leaf number and area: One or two and 40 cm². Cutting length: 2 - 3 nodes.

Number of weeks before rooting starts (with hormones): 7 weeks
Number of weeks before rooting starts (without hormones): 7 weeks
Rooting success (with hormones): 65% after 12 weeks

Rooting success (without hormones): 50% after 12 weeks

Xanthoxylum xanthoxyloides



Badly harvested roots and bark

Species Identity

Family: Rutaceae

Vernacular Names: Kanto, Oyaa

Botanical Description

X. xanthoxyloides is a medium sized tree up to 20 m high and 1.8 m girth. The bole has large woody thorns.

Leaves are pinnate with 3-4 pairs of shining aromatic leaflets, elliptic oblong.

Flowers are small, numerous, white and in dense terminal panicles. Fruits are capsules about 4-5 mm diameter with one seed (Irvine, 1961).

Ecology and Distribution

It is found in semi-deciduous or moist evergreen forest zones. It is native of Cote d'Ivoire, Ghana, Benin and Nigeria (Irvine, 1961).

Threat

Unsustainable methods of harvesting are usually used because roots, bark and shoots are normally heavily destroyed during harvesting.

Uses

Medicine: The root is used for abdominal pains, ulcers and toothache. The bark is used as enema, for eye diseases, for fever, laxative and stomach ache.

The root and bark are for rheumatism, post-delivery pain, cough, hypertension, diabetes, bone fracture, family planning and urine retention.

Reproduction

Flowering is around June and fruiting is from December to March.

Propagation Methods

Seed germination

Seeds are difficult to obtain.

Rooting of cuttings

Rooting medium: unwashed river sand.

Plant part: branchlet of mature tree.

Leaf number and area: one or two 40 cm²

Cutting length: two or 3 nodes

Number of weeks before rooting starts (with hormones): no rooting

Number of weeks before rooting starts (without hormones): no rooting

Rooting success (with hormones): 0%

Rooting success (without hormones): 0%

Seedling and coppice shoots should be tested.

Vitellaria paradoxa



Species Identity

Family: Sapotaceae

Scientific Name: *Vitellaria paradoxa*

Common Name: Shea butter

Vernacular Names: Kra-Nnku, Nkudua, Kanku, Adompo,
Kudompo, Ngu, Nkuteo, Yokuti. (Ghana)

Botanical Description

It is a deciduous medium-sized tree which grows to a height of about 12 m and a diameter of 30-60 cm. It is characterized with a stout bole and a large crown.

The leaves are found at the tips of the shoots and are 3 x 1 cm oblong with wavy margins.

Flowers are creamy white and sweet scented.

Fruits are ellipsoid up to 6.5 cm long and 4.5 cm in diameter. The fruit has a thick butter-like pericarp which is sweet and edible containing generally one seed, sometimes 2 or occasionally up to 6 oval or round red brown seeds (Irvine, 1961).

Ecology and Distribution

It is found in the savannah zone of Ghana.

It is native of Ghana to Nigeria as well as Senegal and Uganda. *V. paradoxa* is indigenous to sub-Saharan Africa (Irvine, 1961).

Threats

It is known for producing quality charcoal and firewood. Seeds are also harvested and processed for oil, reducing the availability for natural regeneration.

Uses

Products and Food: Oil, local butter, margarine, soap, candle, pomade, dyes

Wood: hut poles, house posts, mortar, pestle, bowls, stools, charcoal.

Medicine: It is used in treating headache and cleaning of the eyes. It is also used in most medicinal pomades and ointments for treating fractured joints.

Reproduction

The creamy white flowers appears in October-February during the dry season and fruits in March- September in the rainy season.

Propagation Methods

Seed germination

Germination medium: river sand Start of germination: 70 days Germination period: 120 days Percentage germination: 7%

Rooting of cutting

Rooting medium: unwashed river sand

Plant parts: branchlet of mature tree

Leaf number and area: one or two and 40 cm²

Cutting length: two or 3 nodes

Number of weeks before rooting starts (with hormones): no rooting Number of weeks before rooting starts (without hormones): no rooting.

Rooting success (with hormones): 0% Rooting success (without hormones): 0% Seedling and coppice shoots should be tested.

Conclusion

Medicinal plants play major roles in human life including health, income and cultural values and thus provide motivational forces for their conservation. These ten valuable medicinal plant species have been identified in the West African sub-region and their usefulness by herbal medicine practitioners cannot be overemphasized. If we are able to nurture and propagate them and also adhere to proper harvesting techniques, their availability may be sustained. Seed maturity period as well as propagation methods have been documented.

We hope that this book becomes useful as various pieces of knowledge on their occurrence, uses, threats and propagation have been put together in the handbook. We then have to take good care of them so they in turn take care of us.

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