Suitability of Latex-Producing Plant Species as Bio-security for some Landed Properties in Jos South, Jos, Plateau State

By

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Abstract

This study was carried out to ascertain the suitability of using latex-producing plants as bio-security for some landed properties, Jos South LGA of Plateau state with it's headquarters located in Bukuru town at latitude 9°48'00"N and longitude 8°52'00"E. A total of 10 households and 5 farmlands were sampled. At each land/field, sampling was conducted with a 50 x 100 m (5000 m^2) area of a quadrate. The first graph showed 437 of the plants collected as non latex-producing plants, 4.58% of the plants were used for the fencing (Bougainvillea) of houses characterized by thorns and spines as features of xerophytes, the remaining 95.42% of plants grow in open places affected by anthropogenic activities and were not used for the demarcation of houses or properties. The second graph showed 607 plants as latex producing plant species in the surveyed areas. 4.46% showed the plants were used as horticultural plants (Euphorbia hirta) and herbivores do not eat them because of the harmful latex exuded by the plants when injured. 1.49% was regarded as farm crop (Ipomoea batata) while 92.89% of the plants were used for fencing and demarcation of houses and properties. Most of the plants used as hedges are offensive in nature i.e. having thorns, spines and exude latex etc. they can serve as fence dissuade intruders and herbivores. Most of these plants like Euphorbia species are easy to propagate by stemming and do not require any special care such as watering once they are planted. Inhabitants are encouraged to use this plants to protect their landed properties and as horticultural plants because of their suitability.

Key Words: Suitability, latex-producing plants, Bio-security, landed properties, Jos South, Plateau

INTRODUCTION

The primary role of bio-security is to protect against risks posed by diseases or organisms. Bio-security is a strategic and integrated concept that encompasses the policy and regulatory frameworks for analyzing and managing relevant risks in food safety, public health, animal life and health and plant life and health including associated risks to the environmental risk. (Veronique *et al*., 2021)

Cacti and other succulents are commonly found in deserts, where there is little rainfall. Other xerophytes, such as certain bromeliads, can survive through both extremely wet and extremely dry periods and can be found in seasonally-moist habitats such as tropical forests, exploiting niches where water supplies are intermittent for mesophytic plants to survive (Gechev *et al.,* 2014). They may use water from their own storage, allocate water specifically to sites of new tissue growth or lose less water to the atmosphere and so channel a greater proportion of water from the soil to photosynthesis and growth.

Latex as found in nature is a milky fluid found in 10% of all flowering plants (angiosperms). It is a complex emulsion consisting of proteins, alkaloids, starches, sugars, oils, tannins, resins, and gums that coagulate on exposure to air. It is usually exuded after tissue injury. In most plants, latex is white, but some have yellow, orange, or scarlet latex. Since the 17th century, latex has been used as a term for the fluid substance in plants (Paul, 1993). It serves mainly as defense against herbivorous insects. Latex is not to be confused with plant sap; it is a separate substance, separately produced and with separate functions (Agrawal and Konno, 2009)

Xerophytic plants may have similar shapes, forms and structures and look very similar, even if the plants are not closely related, through a process called convergent evolution. For example, some species of cacti, which evolved only in the Americas, may appear similar to euphorbia, which are distributed worldwide. An unrelated species of caudiciforms plants with swollen bases that are used to store water, may also display some similarities. Latex producing plants are very common in Jos because of it rocky outcrops and it is observed that they are drought resistant plants flourish better because of the influences of soil and climatic requirements, therefore , they are able to adapt to a wide range of soil and climate (De-kock, 1980; Papi and Mbaekwe, 2016).

Under conditions of water scarcity, the seeds of different xerophytic plants behave differently, which means that they have different rates of germination since water availability is a major limiting factor. These dissimilarities are due to natural selection and eco-adaptation as the seeds and plants of each species evolve to suit their surroundings (Ibanez *et al.,* 1997).

LITERATURE REVIEW

Latex is a milky substance produced by some plants, including the tropical rubber tree. It is a mixture of water, sugar, and proteins. Plants usually release latex after they are injured, in the same way that human bleed following an injury. Plants use latex as a defense against insects and herbivores. These latex producing plants are mostly desert plants that are adapted to limited amount of moisture.

Plants and animals living in the desert need special adaptations to survive in the harsh environment. The desert plants tend to be tough and wiry with small or no leaves, water resistant cuticles and often spines to deter herbivores. Some annual plants germinate, flourish and die in the course of a few weeks after rainfall called the ephemerals while other long-lived plants

survive for years and have deep root systems able to tap underground moisture called xerophytes. The most well known latex producing plants found in the deserts, arid and semi-arid deserts are the *Parthenium argentatum* (guayule) and *Pedilanthus macrocarpus* (Agrawal and Konno, 2009; Bauer & Speck, 2012).

USES OF LATEX AND LATEX PRODUCING PLANTS

Natural rubber is the most important product obtained from latex; more than 12,000 plant species yield latex containing rubber, though in the vast majority of those species, rubber is most suitable for commercial use (Atia *et al.,* 2014). Various uses of natural rubber and trees include:

i. Uncured rubber is used for cements; adhesive, insulating, and friction tapes and for crepe rubber used in insulating blankets and footwear.

ii. Resistance to abrasion makes softer kinds of rubber valuable for the threads of vehicle tires and conveyor belts.

iii. Harder kinds of rubber are valuable for pump housings and piping used in handling abrasive sludge.

iv. The flexibility of rubber is appealing in hoses, tyres and rollers for devices ranging from domestic cloth wringers are to printing presses.

v. It's elasticity makes it suitable for various shock absorber and for specialized machinery mountings designed to reduce vibrations.

vi. It's relative gas impermeability makes it useful in the manufacture of articles such as air hoses, balloons, balls and cushions.

vii. Hard rubber is used for articles such as telephone, housing, parts for radio sets, meters and other electrical instruments.

viii. Natural rubber offers good elasticity, while synthetic materials tend to offer better resistance to environmental factors such as oils, temperatures, chemicals and ultraviolet light.

ix. Latex from the chicle and jelutong trees is used in chewing gum.

x. Dried latex from the Opium poppy is called Opium, the source of several useful alkaloids, such as morphine, codeine and papaverine, as well as the street drug heroin.

xi. Synthetic latexes are used in coatings (e.g latex paint) and glues because they solidify by coalescence of the polymer particles as the water evaporates, and therefore can form films without releasing potentially toxic organic solvents in the environment. Other uses include cement additives, and to conceal information on scratch cards. Latex, usually styrene-based, is also used in immunoassays.

xii. Latex is used in many types of clothing. Worn on the body (or applied directly by painting) it tends to be skin-tight, producing a “second skin” effect.

xiii. Latex is used to make many other products including mattresses, gloves, swim caps, condoms, catheters and balloons.

xiv. Latex producing plants are used in various households as ornamental plants as they produce bright and colorful flowers.

xv. Latex producing plants are also used as fences to protect agricultural crops, livestock especially cattle and domestic households.

For some people, the sensitivity to latex is so extreme that replacement of latex products with products from alternative materials may still result in a reaction if the products are manufactured in the same facility as the latex-containing products, due to trace quantities of natural rubber latex on the non-latex products (Shannon and Paul, 1996).

Why Plant a Hedge

A hedge or hedgerow is a line of closely spaced shrubs and sometimes trees, planted and trimmed to form a barrier or to mark the boundary of an area, such as between neighbouring properties like farm land etc. Hedges used to separate a road from adjoining fields or one field from another and of sufficient age to incorporate larger trees, are known as hedgerows. Often they serve as windbreaks to improve conditions for the adjacent crops (Brickel, 2003; Hodson and Sander, 2017).

Hedges, fences and walls all provide boundaries around our gardens but hedges have many advantages over the man-made alternatives which include:

- The cost is considerably lower if you use smaller cell grown hedging plants or the even less expensive bare root plants most of which are deciduous
- Thorny or spiny hedges are tremendously off putting to burglars. Particularly where your boundary is vulnerable, think about Hawthorn. It is thought that crime rates are lower in green areas and even that people are inclined to drive more slowly down a hedge lined street.
- The overwhelming reason to plant a hedge is to provide shelter from winds. Unlike a wall or a fence, which divert the wind upward over the obstruction, creating turbulence, a hedge filters and calms it, which leads to improved air circulation and the formation of a sheltered micro-climate.
- We don't have great views from all sides of window and a hedge can quickly mature to whatever height is appropriate to block the view of rubbish bins, washing lines, compost heaps, or ugly buildings.

- The dark background of an established hedge can help to focus the gardener's eye onto the plants in the foreground.
- All hedges require some maintenance but fences need to be painted and panels which need to be replaced when rotted or wind-damaged. When you factor in the cost, the visual aspects and environmental appeal.
- Dense evergreen hedges are a useful way to reduce noise levels (reduce but not eliminate). The degree of sound deadening is directly influenced by the height, maturity and density of a hedge, and particularly by the elevation of the source of the noise, a noise from above the garden level being more difficult to reduce.
- Leaves in shades of green, grey, yellow, cream, lime and copper, as well as blossom, flowers, fruits and berries, a carefully chosen hedge will reward the gardener with colour throughout the seasons
- Hedgerows regulate water supply for crops in three ways. They are thus are effective at reducing the risk of flooding and are increasingly planted for this purpose
- Hedgerows prevent loss of soil from fields, either through reducing wind erosion or through acting as a barrier to water-borne run-off. (Cameron and Blanusa, 2012; Ghafari *et al.*, 2020)
- Hedgerows reduce the amount of polluting fertilisers, pesticides and sediment that reach watercourses through acting as a physical barrier, through increasing infiltration into the ground and through nutrients being recycled by the trees, shrubs and other plants (Varshney and Mitra, 1993; Hunter, 1995).

MATE RIALS AND METHODS

STUDY AREA

Jos South is a Local Government Area in Plateau State, Nigeria. It houses the Governor's office in Rayfield and can thus be described as the de facto capital of Plateau state. Its headquarters is located in Bukuru town at latitude 9°48′00″N and longitude 8°52′00″E. The LGA has four districts: Du, Gyel, Kuru and Vwang districts. The LGA has total land area of about 1,037 km2 with a population of 306,716 (NPC, 2006). It is the second most populated LGA in the state after Jos-North. Language spoken in Jos South is Berom.

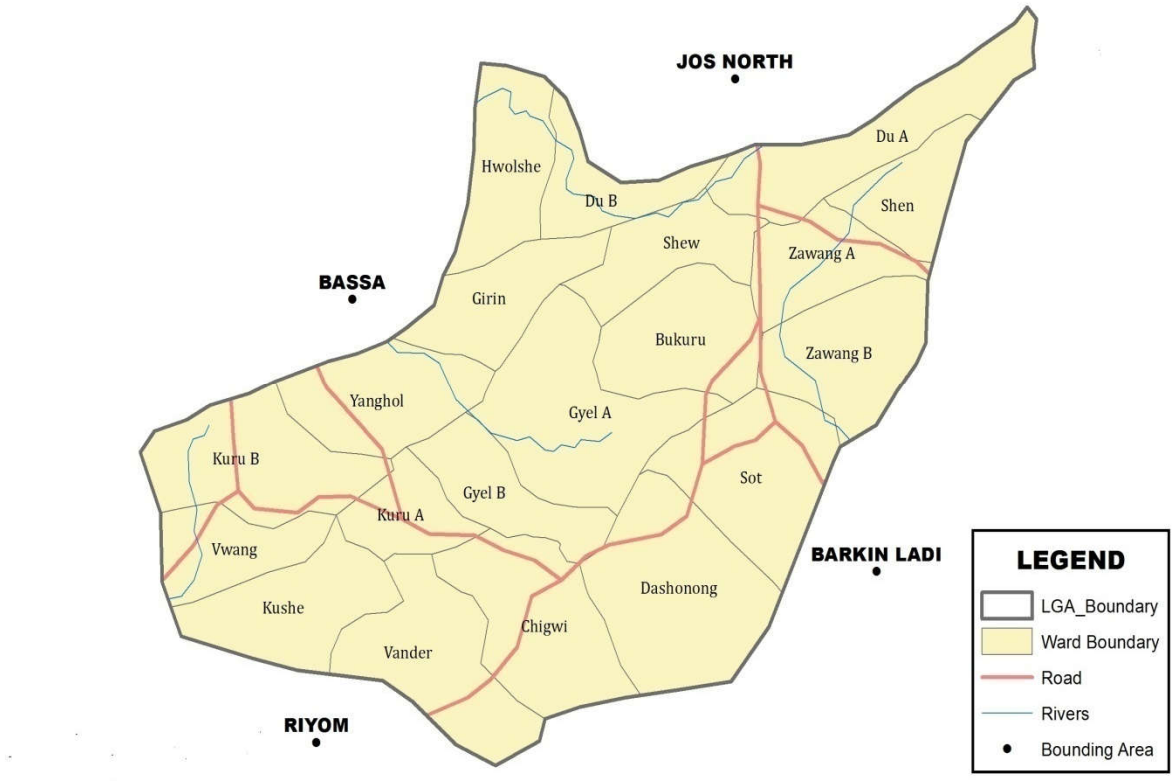


Figure 1: Map of Jos South Local Government Area.

PLANT SAMPLING

A total of 10 household compounds and 5 farmlands were sampled. At each land/field, sampling was conducted within a 50 x 100 m area of a quadrate. The fields sampled gave a representation of the study area. The plots sampled were identified before sampling began to gain an overview of the site layout suitability for data collection. Land owners were informed of which plots would be used for the research.

FIELD MEASUREMENT

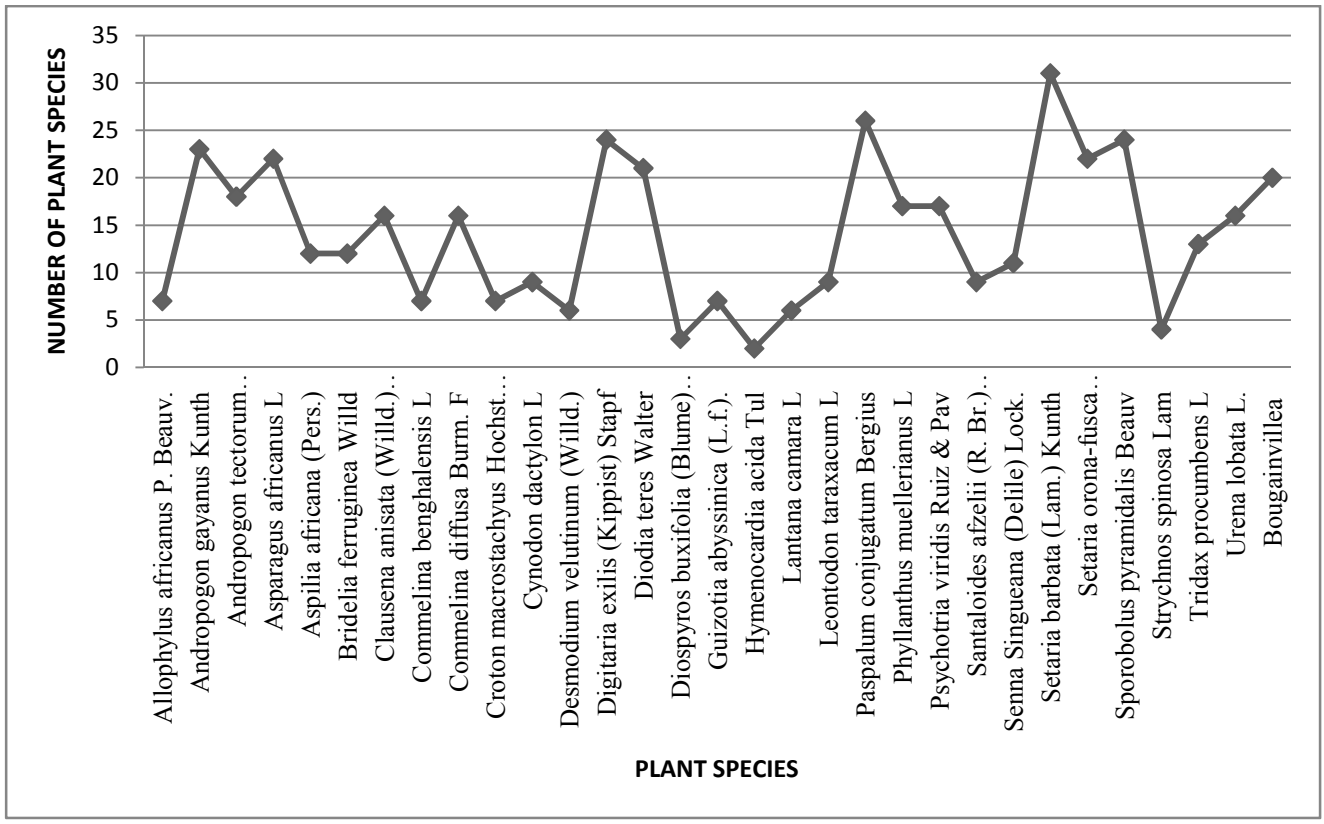
Measurement constituted a significant source from which data were collected for this study. Measurement was conducted on household and farmlands sizes. Regarding field sizes, measuring tapes were used to determine the area of land that is being used. Measurement was also conducted in form of counting plants in each plot.

DATA ANALYSIS

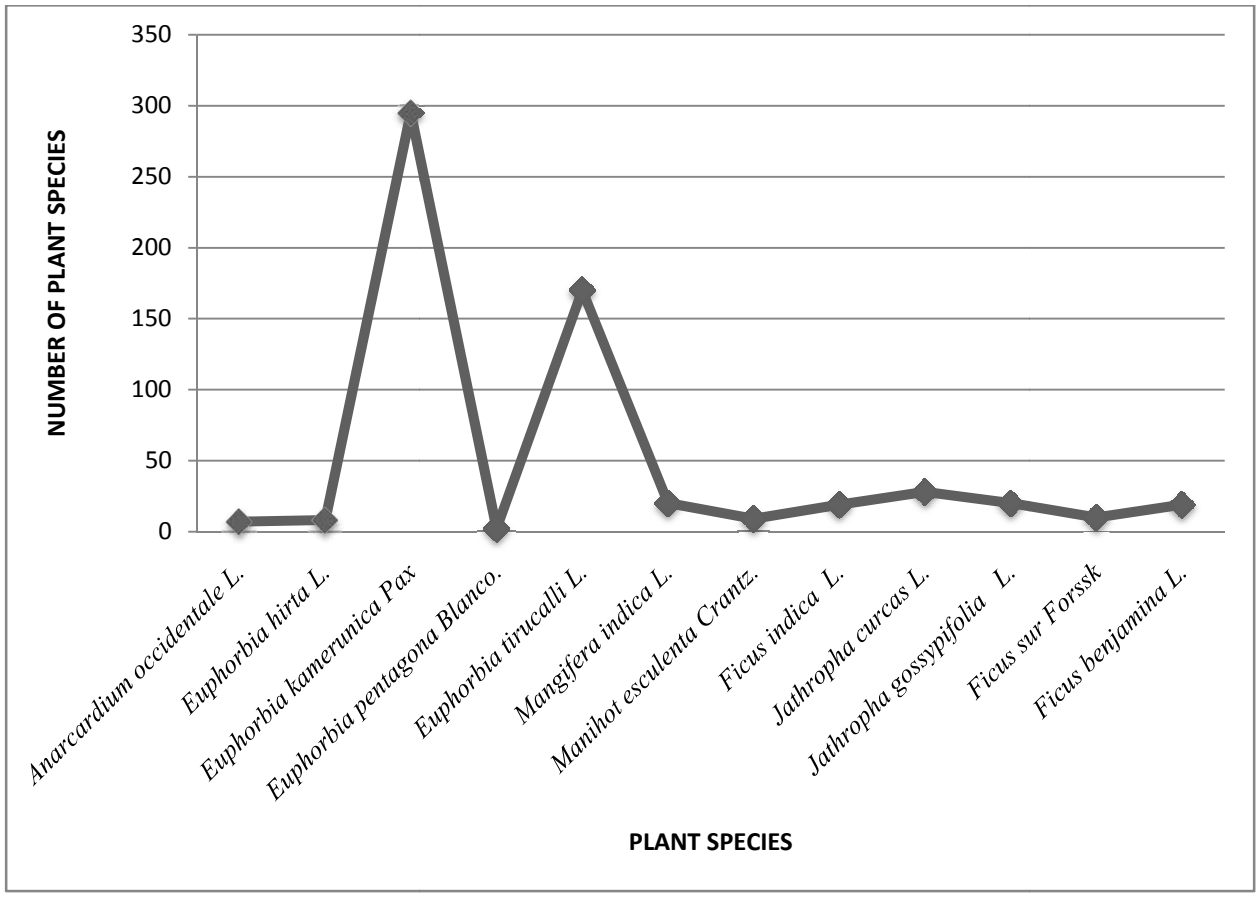
Quantitative data was collected for each plant species. Plant identification was done using a relevant text (Hutchinson *et al.,* 2014). The plants collected were identified and some were identified in the herbarium of School of Forestry, Jos, Plateau State. Data collected were used to estimate plant species in graphs and percentage abundance.

RESULTS

This results show graphs and percentages of plant species, the non latex-producing plants and the latex-producing plants collected during the survey.



Graph 1, shows the number of non-latex producing plant species in the surveyed areas. There were 437 of the plant species, of which 4.58% of the plants were used for the fencing of houses but were not latex-producing plants characterized by thorns and spines features of xerophytes, while 95.42% of plants grow in open places and were not used for the demarcation of houses or properties.



Graph 2, shows 607 of the plants as latex-producing plant species in the area. The graph revealed that 4.46% were seen as wild plant (*Euphorbia hirta*) and herbivores do not eat it because of the harmful latex exuded by the plants when injured. 1.49% was regarded as farm crop (*Ipomoea batata*) while 92.89% of the plants were used for fencing and demarcation of houses and properties.

DISCUSION

The most common families encountered during the study were Fabaceae, Euphorbiaceae, Poaceae, and Asteraceae. The study identified the Poaceae and Euphorbiaceae as the most represented families in the vegetation of the study area. Other substantially represented plant species were the Asteraceae, Fabaceae, and Rubiaceae. *Euphorbia kamerunica* was noted to be

the more frequent latex-producing plant used by inhabitants for the fencing of houses and farm lands probably because it is available and flourished better in the area.

The non latex-producing plants were few in number and survived in the environment that has been devastated by human activities especially rearing of animals in residential areas. The plant *Bougainvillea* is the only plant as a non latex-producing plant that is used for fencing houses, it grows above the walls used as fence and has thorns like some of the Euphorbia species that are suitable for bio-security. The thorns on *Bougainvillea* will help to dissuade intruders from entering the compound via the external walls.

The latex producing plants have peculiar characteristics for the main purpose of bio-security is as follows

1. The thorns and spines present in the latex-producing plants scare away herbivores and intruders. It is better than that ercting walls that somebody can climb through quickly. For an intruder to cut down the plants before he or she goes in, it will attract attention from the community, the effect of the thorns and spines make it very difficult task to accomplished, People are around the community will start asking questions why is this man cutting down this plant that serve as fence, is he or she the owner of the compound?

2. The copious amount of latex exuded by the plant is another hurdle to cross by intruders who want to get access in the compound. The latex comes out profusely and the person cutting cannot help it, it must spread and condemn his clothes. So, it is likely that that intruder or genuine worker on the latex plants might not use the clothes again because of the permanent heavy latex that will smear his or he clothes. It is speculated by farmers that when this latex mistakenly dripped into ones eye, the victim will not see with the eyes again, probably because the latex when it overleaped, it coagulates immediately and affect the lenses, thus affect sight.

3. These plants can survive in a plot of land for over 200 to 300 years and can be exploited from generation to generations by descendants to mark territory and as bio-security to secure members of the family against intruders and herbivores. Some of the oldest trees we have in world history today are latex-producing plants and it is not unconnected with the chemical metabolites found in them, which help to defend the plants against microbes. As a result, parents employed it to demarcate farm lands and plots for their children and grand-children without hitches. Plants like *Jathropha curcas, Jathropha gossypifolia and Euphorbia tirucalli* are used to demarcate farm lands.

4. Latex-producing plants are not eaten by herbivores discretionary, so people utilized these plants as horticultural plants instituted on flower beds outside the fence, animal will not eat it throughout the year. Plants like candle plant, bush milk and others are applied as plants in flower beds because of it suitability against herbivores, when there are less green plants to feed on during the dry season.

5. Latex-producing plants are xerophytic in nature, so if there is no rainfall for 3 to 4 years, the plants will still survive. If it is used for fence or as horticultural plant, the owner my not water it throughout the dry season, unlike the non latex-producing plants that need to be water daily to survive the dry season or else they will all die off.

6. These plants are propagated by stemming, this is an advantage to the person planting it, It takes 9 years for these plants to start appearing on a plot during succession, so it is not a pioneer plant on a sandy or loamy soils (Heinrich and Siegmar, 2002). So one could propagate it at a height of choice for the purpose you want it. One can start cutting at 10 to 15 to provide a height to protect your house or farm yard against intruders.

CONCLUSION

The plants have numerous advantages to protect the users via bio-security against the herbivores and intruders to compounds, farm lands and other properties. The plants could also be used as horticultural plants since it is not eaten by herbivores and one will not water it during the dry season because of their adaptability to drought. Inhabitants are encouraged to habituate these plants to protect their landed properties and utilize as horticultural plants because of their suitability

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