Scientific Research and Essay Vol. 3 (2), pp. 040-045, February, 2008
Available online at http://www.academicjournals.org/SRE
ISSN 1992-2248 © 2008 Academic Journals

Full Length Research Paper

Conservation studies on four medicinal taxa of Southern Nigeria

J. E. Ehiagbonare[1] H. I. Onyibe[2] and P. O. Ehiagbonare[3]

[1]Department of Biological Sciences, Igbinadion University, Okada, Edo State, Nigeria.
[2]Department of Botany, Ambrose Alli University Ekpoma, Edo State, Nigeria.
[3]Department of Microbology Ambrose Alli University Ekpoma, Edo State, Nigeria.

Accepted 4 January, 208

Experiments were conducted to document optimum ways of producing sturdy and suitable planting materials of *Bryophyllum pinnatum, Cordia millenii, Enantia cholrantha* and *Celtis durandii* found in Southern Nigeria. The plants are used in the treatment of various diseases such as earache, fever, malaria, typhoid, jaundice, liver problem and menstrual pains. Forest top soil was observed to be the best growth medium. The sterm cuttings of *B. pinnatum* did not root in all the experiments while leaf rooted along the serrated margin. Within 30 days, 18 seedlings were produced in forest topsoil as against 10 produced in river sand. Significant differences were observed in response to coconut milk treatment under the various time durations. 24 new plants were produced from the leaves soaked for 24 h as against 3 from the leaves of *B. pinnatum* soaked for 1 min from forest topsoil. Lower values from river sand were observed. Mycorrhizal association was observed to exist. Seedlings inoculated with mycorrhizal soil had a mean total value of 90 cm in height growth against the control where 30 cm was obtained. Significant stem rooting was noted in response to coconut milk treatment except with *B. pinnatum* in which zero values were obtained. 60% of the stem cuttings rooted was observed in *E. cholorantha,* and 50% in *C. millenii* and *C. durandii* with 24 h treatment with coconut milk. The determination of the phytochemical constituents revealed that the plants contain saponin, alkaloids, tanins, inulins, potassium mallate, ascorbic and organic acids. The plants are used in the treatment of various diseases such as earache, fever, malaria, typhoid, jaundice, liver problem and menstrual pains.

Key words: Conservation, *Bryophyllum pinnatum, Cordia millenii, Enantia chlorantha, Celtis durandii.*

INTRODUCTION

Conservation can be defined as retaining items of value for the benefit of people in the future. In this context it is common to consider conservation in terms of genetic diversity including species diversity and more natural types of ecosystems. WWF and UNESCO (1992) reported that as a way of encouraging biodiversity conservation "people and plant" initiative was launched with the following objectives – to undertake surveys of wild plant resources, working with local people to identify conservation issues and seek remedies, to empower local communities so that they are more fully involved in land planning and resource management, to increase the number of ethnobotanists especially from developing countries, and actively working with local communities on conservation issues. Today, wide spread of loss of natural ecosystems is occurring worldwide as a result of human activities which include the transformation of more natural types of ecosystems, areas under settlement and biologically impoverished types of agriculture expansion, unsuitable harvesting of wild produce including timber, fuel wood, forage, medicinal plant species, ornamental and aromatic plants and many others, introduction of species deliberately or inadvertently into areas of more natural ecosystems resulting in loss of indigenous species through competition, predation or other mechanisms and sometimes with undesirable effects on properties of the ecosystem.

Conservation of natural resources can be achieved either through the actions of individuals restraining their behaviour conscientiously for the betterment or changing

*Corresponding author. E-mail: drehiagbonare@yahoo.com.

the types or methods of functioning of social institutions. WWF and IUCN (1994) designated 234 sites globally as priority sites. It is held that adequate protection of these sites will ensure the conversation of a substantial proportion of the total world diversity of plants. The criteria used for the selection included a general rule that a site should contain at least 100 vascular land species of which at least 100 are endemic either to the site or the phytogeographical region in which the site occurs.

Howard (1991) advocated the allocation of 20% of total area of a country's forest estate to total protection. In Nigeria (Asiodu, 1997) reported that "forests in Nigeria should be restored to 25% by the year 2010 and meanwhile maintain a ban on export logs, encourage rapid afforestation and create adequate incentive for this activity, identify and rehabilitate all threatened and endangered species of fauna and flora". Fauna and flora are adversely affected through deforestation, a situation which makes the fragile tropical forest ecosystems which house endemic species more vulnerable to extinction. This can culminate in loss of values to mankind.

Ethnomedicinal practice is common in Nigeria and many parts of Africa (Green and Makhubu, 1983). In rural Southern Nigeria, ethnomedicine has been the main engine house of healthcare delivery system. The practice is embraced by both educated and non-educated. The reason for this is the social, economic and cultural values of the people. Furthermore conventional drugs are expensive and unaffordable by the rural populace. The failure of ethnomedicine in some instances is the basis on which the rural populance consult the orthodox medicinal practitioners (Mdluli, 2002). One of the major limitations of ethnomedicine is the secrecy among practitioners. This limits the available information for scientific investigation. Plants are the oldest known sources of human and livestock healthcare, and an important component of global biodiversity (Lambert et al., 2005). The results from this study are intended to provide information on quicker, affordable, practicable and dependable methods of forest regeneration, bioresources conserva-tion and environmental protection. The plant species for the study, after an initial survey and information gathering from the ethnoinhabitants, are listed below with their values and characteristics.

Bryophyllum pinnatum Kurz. (Crassulac)

These plants are usually found in gardens rich in organic manure and sufficient moisture. The English names are air plant and life plant. In Esan in Edo state of Nigeria, it is called anumekue, abomoda in Yoruba and idan-wesin in Benin. The parts used for medicine in ethno practice treatment of wounds of the navel of newly born babies, eara-che, cough, diarrhea and dysentery. Generally the leaves are passed over flame to become soft and thereafter the juice is extracted and administered. The leaves are astringent and antiseptic (Gill, 1992).

Cordia millenii Bak. (Broginaceae)

This is a tropical forest tree with dual uses. It is a medicinal plant and a timber tree. Local names are Omah in Benin, Egin Ogume in Itsekiri and it is called Omo in Yoruba. The part of this species used for phyto medicinal purpose is the stem. The decoction of the bark is used as remedy for fever, general weakness of the body, stomach-ache and as gargles. The powder obtained from the stem bark is used in the treatment of dysentery.

Enantia chlorantha Oliv. (Annonaceae)

This is a highly valued plant due to its diverse uses. The decoction of the root in addition to the root of *carica papaya* is used for malaria treatment. The decoction of the bark of *E. chlorantha* is also used for the treatment of leprous spots and liver damage (Bamgboye et al., 1979). The stem bark has also been reported to be used as antipyretic and uterus stimulant (Oliver, 1960).

Celtis durandii Engl. (Ulmaceae)

The species is called Ohia in Beini, itaho in Yoruba and aziza in Ibo. The species is mostly noted for the treatment of fever and painful menstruation (Gill, 1992). It is also a timber species used for construction works. This current study was conducted in response to global concern on forest conservation especially medicinal and aromatic plants.

MATERIALS AND METHOD

Tropical forest plants are known to be very slow growing. The seeds, when available, loose viability within a short period and have irregular phenology. There is current high degree of deforestation and endemic species easily displaced due to habitat alteration. The production of planting materials and every study to ensure sturdy and healthy planting materials engaged the focus of this current study.

Phytochemical constituents

The main phytochemical constituents of the taxa under study were reviewed using standard laboratory procedure.

Plant materials

These were obtained from the plants under study. In the case of *B. pinnatum*, leaves and stem cuttings were used while for the other plants only stem cuttings were used. All stem cuttings of 3 cm in length with one node were used.

Growth

The growth media used were forest topsoil from the habitat of the species for the treatment and white river sand for the control. All growth media for the experiments were sieved with a fine wire mesh

Table 1. Review of phytochemical constituents, preparation and main medicinal uses of the plants under study.

Scientific name	Family	Plant part	Preparation and medicinal uses	Chemical constituents					
				Ascrobic and Organic acids	Patocin Mallaate	Inulin	Tannins	Akaloids	Saponin
Bryophyllum *pinnatum*	Crassulaceae	Leaves	Leave Juice for earache, wound of navel of new born babies, cough, dysentery	+	+	+	–	–	–
Cordia millenii	Bioraginaceae	Bark	Decoction for fever, general weakness of body, stomach-ache	–	–	–	+	+	–
Enantia chlorantha	Annonaceae	Bark	Decoction of roots for malaria, jaundice, typhoid, liver disease	-	-	-	+	+	+
Celtis durandii	Ulmaceae	Fresh root and potash	Decoction of roots for fever and Menstral pain	-	-	+	+	+	+

+ = Present; - = absent.

to remove coarse materials. Germination and transfer boxes were made locally. The measurements are 1 m wide, 1 m high and 3 m long. Watering cans were purchased locally. The water for watering was obtained from public tap in Benin city, Edo State, Nigeria. The coconuts, from which coconut milk was obtained, were collected from the ecological zone from which the plant materials were obtained. Coconut milk contains growth hormones. In order to inoculate with mycorrhizal soil, soil from the base of old plantation of *Pinus* species was collected.

Leaves propagation

(a) The leaves were used as means of propagation. They were placed in the germination box with the back on the soil and covered with thin layer of soil. This was replicated 5 times both in the experiment and control. The box with the forest topsoil was used for the experiments whereas the one filled with river sand was used as the controls. Forest soil and white river sand were evaluated as growth media in this study. The boxes were watered to field capacity every alternate day. The experiments were monitored for new plant growth every 7 days. Mean number of new plants was recorded and the duration of monitoring was 30 days.

(b) The leaves were immersed in coconut milk for various durations of 1, 2, 3, 4, 5 min, and 1, 2, 3, 4, 24 h. After that they were sown in 5 replicates according to each treatment regime. Watering was done every alternate day in the morning and at the evening with the coconut milk.

(c) At the end of the experiment, 10 seedlings were selected on the basis of uniformity in height growth. Five seedlings were inoculated with mycorrhizal soil by placing the soil round their base and tagged as experiment. The remaining five seedlings were not inoculated and tagged as control. After the period of 30 days of experiment, mean growth in total height, root length, stem length, number of leaves, and root hairs were assessed. Phytosanitation was done manually by hand within and around boxes.

Rooting of stem cuttings

Stem cuttings of the species under study were prepared. Each cutting was 3 cm in length with one node. Their planting bases were dipped into coconut milk for time durations of 2, 4, 6 min and 2, 4, 24 h. After that they were inserted into the boxes filled with forest topsoil or white river sand. The treated stem cuttings were replicated five times and the control (the ones which were not treated) were also replicated five times. The boxes were arranged in randomized block design under light shade made from palm leaves. Rooting was monitored every 7 days for a period of 30 days. At the end of the study, the percentage of rooted cuttings was recorded for each species.

RESULTS AND DISCUSSION

Plants are greatly used in Southern Nigerian for health-care delivery system. Evidence from initial survey showed that the mode of collecting medicinal plants from the wild and the rate of deforestation in Southern Nigeria does not support conservation of biodiversity. One of the problems using seeds as planting materials with tropical species is poor viability and irregular phenology (flowering and fruiting) and hence vegetative propagation is a possible better option (Hopkin, 1974).

Phytochemicals

The most occurred active principles are tannins and alkaloids (Table 1). These were observed to occur in *C. millenii*, *E. chlorantha* and *C. durandii*. Present in *B. pinnatum* are ascorbic and organic acids and inulin. Inulin is also present in *C. durandii*. The differences in chemical com-

Table 2. Effect of mycorrhizal association on seedling growth of *B. pinnatum* at 30 days after sowing.

Parameter	Total height (cm)	Root length (cm)	Stem length (cm)	No. of leaves	No. of root hairs
Treatment	90	30	60	25	30
Control	30	10	20	15	12

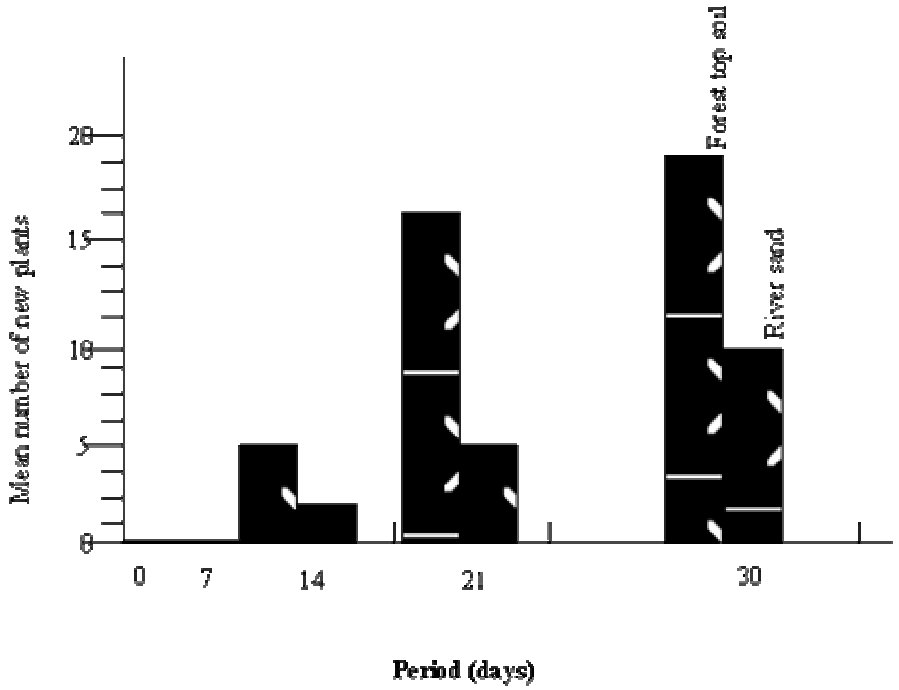

Figure 1. Effect of growth media on the formation of new plants from *Bryophyllum pinnatum* leaves.

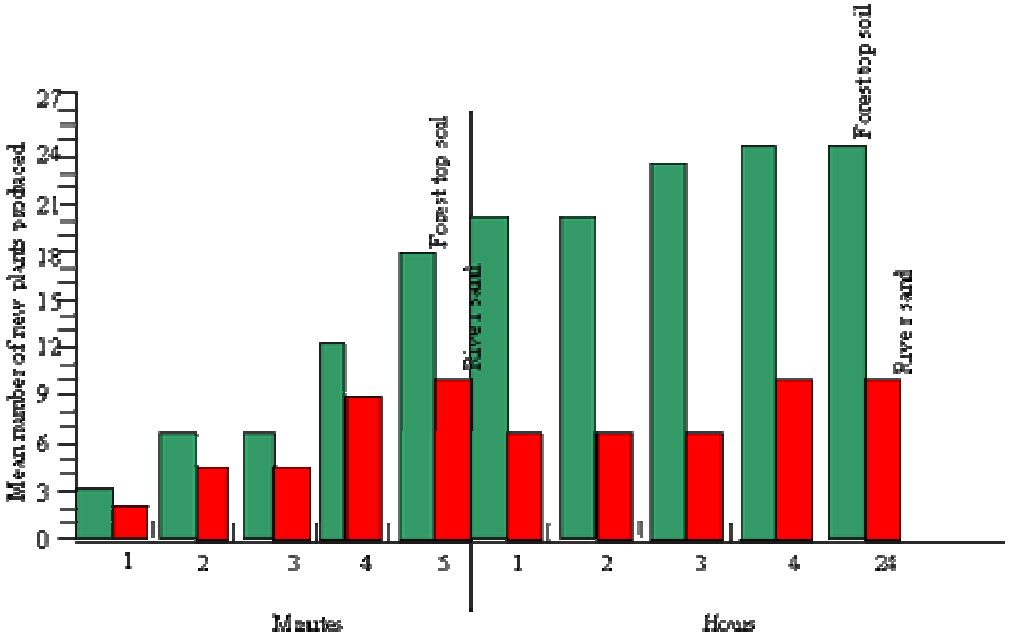

Figure 2. Effect of coconut milk on the production of new plants of *Bryophyllum pinnatum.*

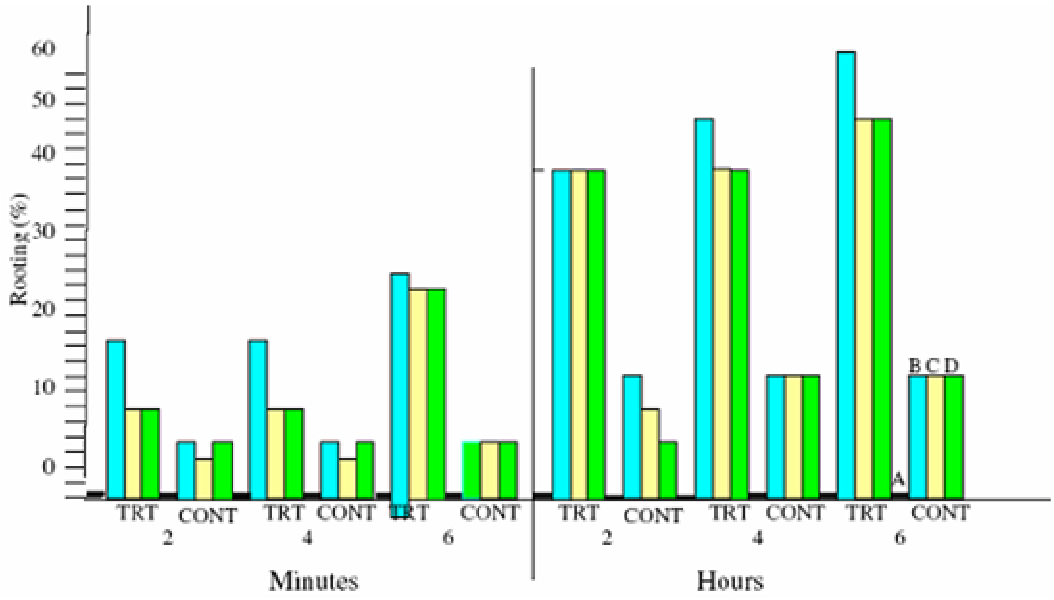

Figure 3. Effect of coconut milk on rooting stem cuttings of *B. pinnatum, C. millenii, E. chlorantha* and *C. durandii* at 30 days after treatment. A = *B. pinnatum*, B = *E. chlorantha*. C = *C. millenii*, D = *C. durandii*, TRT = treatment and CONT = control.

position of the species indicated the individuality of the species. Many vascular plants have bioactive principles which have been found responsible for the antimicrobial properties of some medicinal plants (Amusan et al., 1994).

New plants from leaves

New formed plants were observed along the serrated margins of the leaves of *Bryophyllum pinnatum*. There were significant differences between the number of new plants observed in forest top soil and white river sand. The highest mean number of new plants observed in forest top soil was 18 and the lowest was 5 while in the river sand the highest mean value was 10 and the lowest 2 (Figure 1). These findings implied that forest top soil is the best growth medium for *B. pinnatum.*

The results on the effect of coconut milk on the production of new plants of *B. pinnatum* are presented in (Figure 2). As evidenced from the study, the mean production of new plants of *B. pinnatum* was more in forest topsoil and with increased period of immersion in coconut milk (Figure 2). The highest mean number of 24 new plants was obtained from leaves immersed in coconut milk for 24 h and sown in forest topsoil. From river sand under the same period, only 10 new plants were produced.

Pinus species contains some of the beneficial fungi which enhance plant growth. This is the first time the effect and existence of mycorrbizal association has been evaluated and established with respect to the species under study. Significant difference were observed between treatment and control (Table 2).

Rooting stem cuttings

The results of the effect of coconut milk on rooting stem cuttings are presented in (Figure 3) Significant [at 5 and 1%] response to coconut milk was observed. The stem rooting percentage was highest in plants treated for 24 h with coconut milk; 60% for *E. chlorantha*, and 50% for *C. millenii* and *C. durandii*. *B. pinnatum* did not respond to this treatment, zero values were obtained from both treatment and control. It is confirmed from the result of the control and treatment that propagation of *B. pinnatum* cannot be done by stem cuttings. The observation from the study revealed that longer period of treatment yielded higher values (Figure 3). Apart from *B. pinnatum,* planting materials can be raised in the nursery using stem cuttings. Vegetative method, therefore, is the optimum method of propagation for the species under study. The most occurred active principles are tannins and Mycorrhizal association is a beneficial association between the roots of plants and some fungi e.g. the *Boletus* and *Pinus* species. The soil from the base of

The results form this current study have shown that for the plants under study to be available on sustainable basis and continue to play their role in health care delivery system, they should be domesticated. The optimum planting materials, as evidenced from this study, are the leaves for *B. pinnatum*, while for *E. chlorantha, C. millenii* and *C. durandii* stem cuttings of 3 cm with a single node should be used. Growth medium of forest topsoil, growth hormones (coconut milk) and inoculating seedlings with

mycorrhizal soil had significant effect on rooting stem cuttings and the leaves of *B. pinnatum* and seedling growth. These are recommended in raising new plants in a tree nursery.

REFERENCES

Amusan OOG, Bhembe FN, Mkhatshwa FT, Thwala EZ (1994). Antibacterial activity of *Annona Senegalensis, Andrachne ovalis and spathodea campanulata* against pseudomonas solanecearum, UNISWA. J. Agric. (3):62-66.

Gill LS (1992). Ethnomedical uses of plants in Nigeria. University of Benin Press, Benin City, Edo State, Nigeria. pp. 46-47.

Green EC, Makhubu LP (1983) Traditional Healers in Swaziland towards improved co-operation between the traditional and modern health sectors. Ministry of Health, Mbabane.

Howard PC (1991). Nature conservation in Uganda's tropical forest reserves. I.U.C.N Gland, Switzerland and Cambridge U.K. p. 313.

Lambert JDH, Ryden PA, Esikuri EE (2005). Capitalizing on the bioeconomic value of multi-purpose medicinal plants for rehabilitation of dry lands in sub-sahara Africa. The international Bank for reconstruction and development. The World Bank Washington D.C. U.S.A. pp. 11-14.

Mdluli K (2002). Management of HIV/AIDS with traditional medicine. In: Makhubu LP, Amusan OOG, Shongwe MS (Eds). Proceedings of the workshop on the management of HIV/AIDS with traditional medicine Kwaluseni, Swaziland.

Oliver B (1960). Medicinal plants in Nigeria. University of Ibadan, Nigeria. P. 139.

WWF, ILCN (1994) Centre for plant diversity: a guide and strategy for their conservation, Vol. 1 (Europe, Africa, South West Asia and the Middle East) I.U.C.N Publication Unit. Cambridge U.K. p. 354.

WWF, UNESCO (1992). Biodiversity Conservation. International Gland Switzerland pp. 1-25.

Asiodu J (1997). Ecology. The Presidency Abuja Nigeria. pp. 1-70