



Comparative Analysis of Phytochemical Composition of Leaf, Bark and Root of Brimstone (*Morinda lucida. Benth*) Tree in Igabi Eco-Region of Kaduna State, Nigeria

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Abstract

Comparative Analysis of Chemical composition of leaf, Root, and Stem of Brimstone (*Morinda lucida*) plants in Igabi eco-region of Kaduna state was studied. The roots, leaves, and stem samples were randomly collected from Federal College of Forestry Mechanization and her environs. The sampled were air dried in the laboratory at a room temperature. The dried sampled was chopped into pieces and ground separately to powder using blender. The powdered samples were store in small plastic air tight container which was then taken for analysis. The data obtained from the laboratory was analyzed using two ways analysis of variance (ANOVA) using GLM procedure of SAS. The results show the presence of tanins, alkanoids, flavinoids, terpanoids, saponins, Steroid, phenols and cardiac glycosides in various concentrations as there were significant differences ($P < 0.05$) between these phytochemicals and the plant parts. The presence of various active ingredients in the different parts of these plants explains their diverse use of the plant in treatment of different disease conditions. However, it is recommended that due to increase interest in the medicinal values and utilization of the brimstone plant, there is a need to create awareness about its conservation and further research should be carried out for its other uses.

Keywords: Phytochemical, brimstone, Eco-region, Kaduna State, Utilization

Introduction

Morinda lucida Benth. (Rubiaceae) is a tropical West Africa rainforest tree also called Brimstone tree. In Cote d'Ivoire, it is locally called Sangogo or Bondoukou alongua while in Ghana, it is known as Twi, Kòn kròmà or Ewe amake. Among the Togolese, the plant is popularly known as Ewe amake or Atak ake while among the Yoruba natives (South-West Nigeria), it is called Òruwó [1]. Different parts of the plant are attributed with diverse therapeutic benefits. For example, in Southern Cameroon, cold decoction of the plant leaves is used for the treatment of fever [1]. However, in most

parts of West Africa, the bitter water decoction of the plant bark, root and leaf are used as bitter tonic and as astringent for dysentery, abdominal colic and intestinal worm infestation [1]. The Europeans sometimes use the decoction of the plant root or stem to make "bitters" [1].

It is rich source of two powerful antioxidants, vitamins A and E which could be effective in combating degenerative diseases like atherosclerosis; vitamin K, different secondary metabolites responsible for the ethnomedicinal properties of the plant-alkaloids, tannins, saponins, flavonoids, phenols. Nutrient component which showed moderate qualities of

proximate compounds- carbohydrates, protein, fat, fiber, ash and high moisture content; bioactive phytochemical which act as antibiotic, antiviral, anti- plasmodial and anti-parasitic. The plant is an excellent source of phytochemical constituent and nutritive components and the leaves contain high level of vitamin K which helps in building of strong bone with various extracts of the plant dried leaves documented to possess trypanocidal [2]. Brimstone tree is locally used in the treatment of irregular menstruation, insomnia and jaundice, also in the treatment of wound infections, abscesses and chancre. The decoction is also reported as antidiarrhea if taken thrice daily. Decoction and infusions of plasters of root bark and leaves are recognized remedies against different types of fever, including yellow fever, and malaria [3,4]. It is reported to possess strong trypanocidal and aortic vasorelaxant activities. The leaf and stem bark is reported to possess anticancer, hepatoprotective, cytotoxic, and genotoxic, anti-spermatogenic, hypoglycemic and anti-diabetic activities. The leaves effectively treat and improve all forms of infertility in women. trypanosomiasis, and feverish condition during childbirth. The plants in some cases, is employed in treating diabetes, hypertension, cerebral congestion, dysentery, stomach ache, ulcers, leprosy and gonorrhoea. *Morinda lucida* is reported to contain steroid which makes them useful against cerebral malaria and also confirming its effectiveness as anti-plasmodia agents. *Morinda lucida* is extra pancreatic in nature with the exception of the possibility for stimulating the liberation of insulin already produced by beta-cells. *Morinda lucida* was observed to lower blood sugar of one diabetic patient [5]. Among the Yoruba herbalists (South-West Nigeria), fresh leaves of the plant are often macerated in palm-wine and its bitter decoction is used in the oral treatment of suspected diabetic patients usually for a few days [6]. *Morinda lucida* is a nutrient factory and is readily available throughout the year in southwestern Nigeria. The toxicity of *morinda lucida* is largely unknown. However, one study report that large doses of extract can be administered without danger [6].

Methodology

Study Area

The study was conducted in Federal College of Forestry Mechanization and her environs. The college was located on latitude 10° 37'N and longitude 7° 17'E of the prime meridian. The vegetation in the local government is guinea savannah. The study area occupies one of the major agricultural economies of the state. The major crops grown in the area include maize, cassava, millet, sorghum, guinea-corn, water melon and so on. The area consists of different tribes such as

Yoruba's, Hausas, Igbos Fulani's and Gbagyi's living together in peace and harmony. It has an annual rainfall of about 1000mm -1500mm per annum. The area has a projected population of about 570,000 people and cover an area of about 4556.95square kilometer (KM²) [7].

Data Collection

➤ Processing of Plant Materials for Phytochemical Analysis:

Morinda lucida Benth leaves, stem and root were collected from Federal College of Forestry Mechanization and her environs. They were identified at the herbarium Department of Forestry Technology, Federal College of Forestry Mechanization. The different parts of the selected plant materials were air dried in the College laboratory. The dried sample was chopped into pieces and ground separately to powdered form using blender. The powdered samples were stored in small plastic air-tight containers which were taken for analysis at National Research Institute of Chemical Technology (NRICT) Zaria, Nigeria.

➤ Phytochemical Screening

The extract was examined for the presence of the following phytochemicals: Alkanoids, saponins, cardiac glycosides and flavonoids. The method described by Herborn [8] was used to ascertain the presence of alkanoids and glycoside. The presence of saponins was detected using the method adopted from Odebiyi and Sofowora [9], while flavonoids and terpenoids was screened using the method of Trease and Evans [10].

Analytical Techniques

➤ Analysis of Variance (ANOVA)

Two-ways Analysis of Variance (ANOVA) using GLM procedure (prec GLM) of SAS (Statistical Analysis System) was used to show the comparison between the photochemical composition of the leaf, stem and root of the plant. The data was expressed as mean standard deviation (mean of 3 determinations) and differences was considered significant at $p < 0.05$.

Results and Discussion

Phytochemical constituents of brimstone (*Morinda lucida*) plants show the presence of medicinally active compositions in various quantities in different plant part. However, the quantitative estimation of the crude constituents in the plants parts study are presented in Table 1 below:

| S/N | Parts | Tanins (Mg/100g) | Terpenoids (Mg/100g) | Alkanoids (Mg/100g) | Flavonoids (Mg/100g) | Steroids (Mg/100g) | Saponins (Mg/100g) | Phenol (Mg/100g) | Glycosides (Mg/100g) |
|-----|-----------------|---------------------|-------------------------|------------------------|-------------------------|-----------------------|-----------------------|---------------------|-------------------------|
| 1 | Leaves | 1.50a±0.003 | 2.40b±0.088 | 2.74b±0.009 | 0.30a±0.003 | 1.18a±0.005 | 0.08a±0.005 | 4.94a±0.004 | 0.53a±0.004 |
| 2 | Barks | 1.45b±0.002 | 3.98a±0.015 | 3.21a±0.006 | 0.09b±0.007 | 1.18a±0.005 | 0.08a±0.005 | 4.94a±0.004 | 0.53a±0.004 |
| 3 | Root | 0.51c±0.003 | 2.01c±0.004 | 0.29c±0.004 | 0.09c±0.003 | 0.55b±0.006 | 0.06b±0.007 | 1.06b±0.005 | 0.18b±0.005 |
| | LSD (P<0.05) | 0.003 | 0.008 | 0.006 | 0.003 | 0.005 | 0.005 | 0.004 | 0.004 |

Table 1: Quantitative phytochemical composition of brimstone (*Morinda lucida Benth.*)

- Figures are expressed as mean ±SD
- Figures bearing different alphabets differ significantly (p<0.05)
- Figures bearing the same alphabets are not significantly different (p<0.05)

Table 1 shows that significant differences (P<0.05) exists between the plant parts. Leaves of *Morinda lucida* had the highest composition of flavonoids, steroids, tanins, phenols and glycosides while the bark had the highest composition of terpenoids and alkanoid while the roots had the least composition of saponins, glycoside, flavonoids, steroids and tanins Suradkar, et al. reported the presence of terpernoids, saponins, alkanoids and cardiac glycoside in the leaves and the bark of the extract of *Morinda lucida*. They thus, concluded that the presence of these chemical could possibly explain the scientific basis of the plants in the medicinal utilization by the traditional healers in treatment and prevention of various diseases across West African Countries. The results above are also in agreement with the work of Schneider and Wolfking, and Okwu and Omodamiro [11,12] who documented that the presence of saponins, alkanoids and cardiac glycosides in *Morinda lucida* has contributed to the medicinal utilization of the plant in treatment of congestive heart failure, diabetes, allergies and ulcers.

Conclusion and Recommendation

Conclusion

It is evident that the iconic brimstone (*Morinda lucida*) plant is an important medicinal resource used to treat and prevent a range of health hazards. The reason been the presence of high level of photochemical compositions found in the plants parts.

Recommendation

Based on this study it is recommended that

- There is need to create awareness of the environmental conservation and protection of this medicinal plant biodiversity.
- Government through relevance agency/ parastatals should stop individuals from indiscriminate destruction of the forest and encourage afforestation of brimstone and medicinal plants in general. Similarly, sustainability

of biodiversity and biological resources should be ensured so that individual plants do not go into extinction.

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