



## A Review of the Ethnobotanical, Phytochemistry and Medicinal Values of *Phragmanthera incana* (Schum) Hemi-Parasitized in Southwestern Nigeria

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### ABSTRACT

The ethnobotanical applications, phytochemistry and medicinal values of *Phragmanthera incana* (Schum), a specie of mistletoes and a hemi-parasitic plant was reviewed. The review compiled various ethnobotanical claims from traditional healers through a structured interview and scientific evidences on some of the claims. The ethnobotanical survey revealed that the leaves were used to treat hypertension (80%), diabetes (70%), insomnia (70%), weight reduction (96%), reducing blood lipids level (90%), and for general well-being (97%). The plant possesses some bioactive compounds and macro minerals. It has been scientifically validated for antimicrobial, antidiabetic and antihypertensive activities. The ethnobotanical use of *P. incana* as indicated by the survey, on diabetes, hypertension and insomnia and general well-being had been previously reported. In conclusion, there is need for further scientific validation of these claims; clinical investigation and chemical characterization of the bioactive compounds.

**Keywords:** *Phragmanthera incana*, Mistletoe, Ethnobotanical, Phytochemistry, Weight reduction, Lipid lowering potential.

### Introduction

Mistletoes are hemi-parasitic plants which belongs to the polyphyletic group.<sup>1</sup> They represent a family of plant species with structural diversity and untapped reservoir of novel compounds for drug discoveries.<sup>2</sup> They obtain their nutrients and structural supports from the host trees. Mistletoes have common names such as Devil's fuge, Iscador, all heal, bird lime, and are mostly of the families of *Loranthaceae* and *Viscaceae*. Most genera of African/Nigerian mistletoes belong to the family *Loranthaceae*.<sup>3</sup> Mistletoe was described as "an all-purpose herb" due to its vast ethnomedicinal usage, which include; antihypertensive, antidiabetic, antispasmodic, diuretic and in the treatment of headache, infertility, epilepsy, menopausal syndrome, rheumatism, hyperlipidemia and general well-being.<sup>3-11</sup> *Phragmanthera incana* (Schum) belongs to the family of *Loranthaceae*, a specie of mistletoe found growing on trees mostly in southwestern part of Nigeria.<sup>5,7</sup> *P. incana* is a woody hemi-parasitic plant, with stems up to 2 m long; its young parts are densely covered with brown hairs and the berries are red in color (Figure 1).<sup>7</sup> It is found in secondary jungle and bush savanna area; from Sierra Leone to West Cameroon and Fernando Po Island (Gulf of Guinea that forms part of Equatorial Guinea), and extending across the Congo basin to Zaire, Angola and Nigeria. The plant is very variable in form, common and widely distributed.<sup>12</sup> Its taxonomy kingdom is Plantae, division: Tracheophyta, subdivision: Spermatophytina, class: Magnoliopsida, order: Santalales, family: Loranthaceae, genus: *Phragmanthera*, species: *incana* and botanical name: *Phragmanthera incana*.

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**Figure 1:** (a) Leaves and Berries stick of *P. incana*; (b) Leaves, Stem and Berries of *P. incana*

### Methods

#### Ethnobotanical Survey

A survey was carried out around the South-western states; Lagos, Ogun, and Oyo of Nigeria using structured interview of individuals who are knowledgeable on the subject matter. The survey engaged herb sellers and traditional practitioners (also known as traditional healers) on the usefulness of mistletoe particularly *P. incana* in ethnomedicine, as well as its harvesting methods. Twenty-five randomly selected individuals were interviewed.

### Results and Discussion

#### Ethnobotanical Report

Ethnobotanical survey reveals that Mistletoes leaves are generally known in Yoruba language as "Afomo", "Kauchin" in Hausa and "Awure" in Igbo language. *P. incana* is sometimes referred to as "afomo onishana" because its flower has specules like that of a match as shown in Figure 1. *P. incana* is a specie of mistletoe commonly found in South-Western part of Nigeria. The interviews revealed that the plant is hemi-parasitic on selected trees such as *Anacardium occidentale* (cashew), *Kola acuminata* (kolanut), *Magnifera indica* (mango) and *Psidium guajava* (guava). Ogunmefun *et al.*<sup>7</sup> had earlier

reported the presence of the plant on three host trees; *A. occidentale*, *K. acuminata* and *M. gabonensis*. The ethnobotanical survey conducted (twenty-five traditional healers were interviewed) revealed that the plant is harvested with a long stick or sickle early in the morning. A sickle equipment is used to cut down branches with heavily infested mistletoe (as represented in Figure 2). The leaves are kept under shade until they are dry for about one to two weeks and used as infusion of tea for one week. The fresh leaves can also be harvested and used as infusion of tea for one week. Many of the traditional healers interviewed revealed that, the leaves were used to treat hypertension (80%), diabetes (70%), insomnia (70%), weight reduction (96%), reducing blood lipids level (90%), and for general well-being (97%). *P. incana* is referred to as the traditional healer's secret, "Asiri Inu Ikoko" or "Asiri Isale Ikoko"; the special ingredient of their medicine. The ethnobotanical use of *P. incana* as indicated by the survey, on diabetes, hypertension and insomnia had been previously reported by Ogunmefun et al.,<sup>7</sup> However, this is the first time the weight reduction and lipid lowering potentials are being reported.

#### Phytochemistry and Mineral composition

*P. incana* leaves possesses different bioactive compounds. Phytochemical analysis shows that flavonoids, terpenoids, alkaloids, saponins, tannins, anthraquinones, cardenolides are present in the leaves.<sup>13,14</sup> However, these bioactive compounds vary across the host tree which they are semi parasitic on.<sup>7</sup> Pharmacological study revealed the presence of *phragmanthin*, which has been documented to decrease the level of plasma phosphatase, haemoglobin, muscle glycogen and blood glucose.<sup>13</sup> The proximate analysis on *P. incana* leaves showed that the samples contain varying amounts of moisture, ash, crude protein, crude fat, crude fibre, carbohydrates and minerals.<sup>15</sup> Study on the mineral components of *P. incana* leaves and their respective host trees (cocoa, kolanut and bush mango) showed that the leaves and stem bark of the host plants possess varying quantities of major cations. The leaves are rich sources of dietary elements essential for biochemical processes and body metabolism.<sup>15</sup>

#### Medicinal Values

##### Antimicrobial Potential

The antimicrobial activities of fractions of *P. incana* leaves obtained from Cocoa and Kolanut were tested *in-vitro* against five Gram-negative pathogenic bacteria viz; *Proteus mirabilis*, *Aeromonas bestiarum*, *Citrobacter youngae*, *Pseudomonas aeruginosa* and *Morganell amorgani*; two Gram-positive bacteria viz *Bacillus cereus* and *Staphylococcus aureus* species and three pathogenic fungi *Aspergillus niger*, *Aspergillus flavus*, *Trichoderma* using agar well diffusion technique.<sup>16</sup> Valuable antibacterial property was observed with methanol extracts of *P. incana* on some of the tested bacterial species while the fungal species employed in this study were all resistant. The observed antibacterial activities of the various crude extracts against the test bacteria may be as a result of the presence of secondary metabolites which are known to possess antimicrobial activities.<sup>16, 17</sup> It may also have involved complex mechanisms like the inhibition of the synthesis of bacterial cell wall, cell membrane, nucleic acid and proteins as well as the inhibition of the metabolism of nucleic acids.<sup>16</sup>

##### Antidiabetic activity

The anti-hyperglycemic effect of concentrated hot water infusion of *P. incana* leaves and its ameliorative effect on parameters related to diabetic complications in a diabetic rat were evaluated by Sanni et al.,<sup>18</sup> A single oral dose of the infusion was given daily for 5 days a week and for four weeks. A significant improvement in body weight and reduced blood glucose were observed from rat group treated with the plant infusion. A significantly increased pancreatic  $\beta$ -cell function (HOMA- $\beta$ ) and insulin secretion with the reduction in serum  $\alpha$ -amylase activity and liver function enzymes were also observed. Their study demonstrated the ability of *P. incana* leaves to delay the onset of diabetic complications.<sup>18,19</sup>

##### Antihypertensive activity

Aduragbenro et al.,<sup>3</sup> evaluated the antihypertensive effect of ethanol extract of *P. incana* leaves in NG-nitro-L-arginine methyl ester (L-NAME)-induced hypertensive rats. The rats were administered 50, 100 and 200 mg/kg of ethanol extract of *P. incana* leaves or captopril (40 mg/kg) daily for 28 days together with oral administration of L-NAME (40 mg/kg). Blood pressure parameters were measured weekly for four weeks. The study observed a significant reduction in systolic blood pressure and mean arterial pressure in a dose dependent manner and a significantly reversed elevated IL-6 and TNF- $\alpha$  in hypertensive rats.<sup>3</sup>

##### Toxicity

Ogunmefun et al.,<sup>20</sup> determined the acute and sub chronic toxicity of *P. incana* leaves on female Wistar rats. They discovered that methanol extract of the plant at 1000, 2000, 3000, and 5000 mg/kg doses was safe for up to seven days. Further studies showed that a single oral dose of methanol extracts of *P. incana* at 200, 400, 600 and 800 mg/kg body weight to female Wistar rats for 3 days were also relatively safe for use.<sup>20,21</sup>



Figure 2: *P. incana* in its natural habitat

#### Conclusion

*P. incana* leaves possess some bioactive compounds which could exude its antimicrobial, antidiabetic and antihypertensive potentials. Therefore, there is a need for further scientific validation of these claims, chemical evaluation and further clinical investigations.

#### Conflict of Interest

The authors declare no conflict of interest.

#### Authors' Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

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