

Biochemical Information from the leaves of *Pterocarpus mildraedii*

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Abstract: Given the wider spread of the *Pterocarpus mildraedii* plant in several parts of Nigeria and procurement of nutritional and composition records is most needed in the scientific database because it may provide baseline data for further research or application. The present study report results from proximate, elemental and GCMS of *Pterocarpus mildraedii* leaf. The leaf of this plant is found to be rich in proximate parameters and in some essential elements such as K, Ca, Na and Mn. The major phytochemicals identified from the plant leaf were methyl petroselinate, methyl isoheptadecanoate and methyl 14-methylpentadecanoate.. The study review previous literature on the identified phytochemicals and concluded that they contain essential oils that display strong biological activity and could be useful for pharmaceutical and other applications.

Keywords: *Pterocarpus mildraedii*, leaf, proximate, elemental and phytochemical composition

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1.0 Introduction

Knowledge of the chemical, biochemical and other functional components of plant or food

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materials is an essential framework that can furnish information on the usefulness of the application of such plant materials (Eddy *et al.*, 2010). Such composition may include its proximate and mineral composition, which are relevant for their nutritional assignments. Information on phytochemical constituents is maybe useful in pharmaceutical, cosmetic and other applications. Some plants have been found to possess antimicrobial, anti-insecticidal and other biological activities that have prompted research toward the discovery of their essential needs, beyond food Fitzgerald *et al.*, 2020; Sofowora *et al.*, 2013). Based on the above review, the present study was conducted to analyze the leaves *Pterocarpus mildraedii* leaf for its proximate, mineral and phytochemical constituents. This plant is locally called;oha' in igbo and mkpafere in efik. It is a popular vegetable in South-East and South-South Nigeria. Literature is scanty on detailed evaluation of the phytochemical and chemical constituents of the plant. Therefore, the results from the present study shall complement existing information.

2.0 Materials and Methods

All proximate and mineral analyses were conducted using Standard, A.S.T.M. (2002) methods. The proximate parameters that were analysed included protein, fat, ash, fibre and carbohydrate. The analysis of Ca, Zn, Fe and Mn were done using atomic absorption spectrophotometer.

The GCMS analysis was carried out using GCMS-QP2010 PLUS SHIMADZU, JAPAN machine. The column temperature of the machine was initially set at 60.0 °C while the initial temperature of the injector was 250.00 °C. Other parameters were velocity Pressure

(100.2 kPa), total flow = 6.2 mL/min, column flow = 1.61 mL/min, linear Velocity = 46.3 cm/sec and purge flow = 3.0 mL/min. The oven temperature was gradually raised until it reached 250.00 °C. Samples for GCMS were prepared as ethanol extract using the cold evaporation method.

3.0 Results and Discussion

Some proximate constituents of the dried leaf of the studied leaf are protein (24.83%), fat (4.21%), ash (8.43%) and fibre (8.45%). These values are closely related to those reported by Akainyung *et al.* (1995). The mean elemental

constituents were sodium (200 mg/g), potassium (100 mg/g), calcium (130 mg/g), zinc (130 mg/g), iron (15 mg/g) and manganese (5 mg/g). These values are also comparable to those reported by Akinyeye *et al.* (2010) and Usunobun *et al.* (2016) for the same plant leaf from Western Nigeria.

The GCMS spectrum of *Pterocarpus mildraedii* leaf is shown in Fig. 1. The spectrum reveals seven peaks. Retention time, the concentration of identified compounds and other information deduced from the chromatogram are presented in Table 1

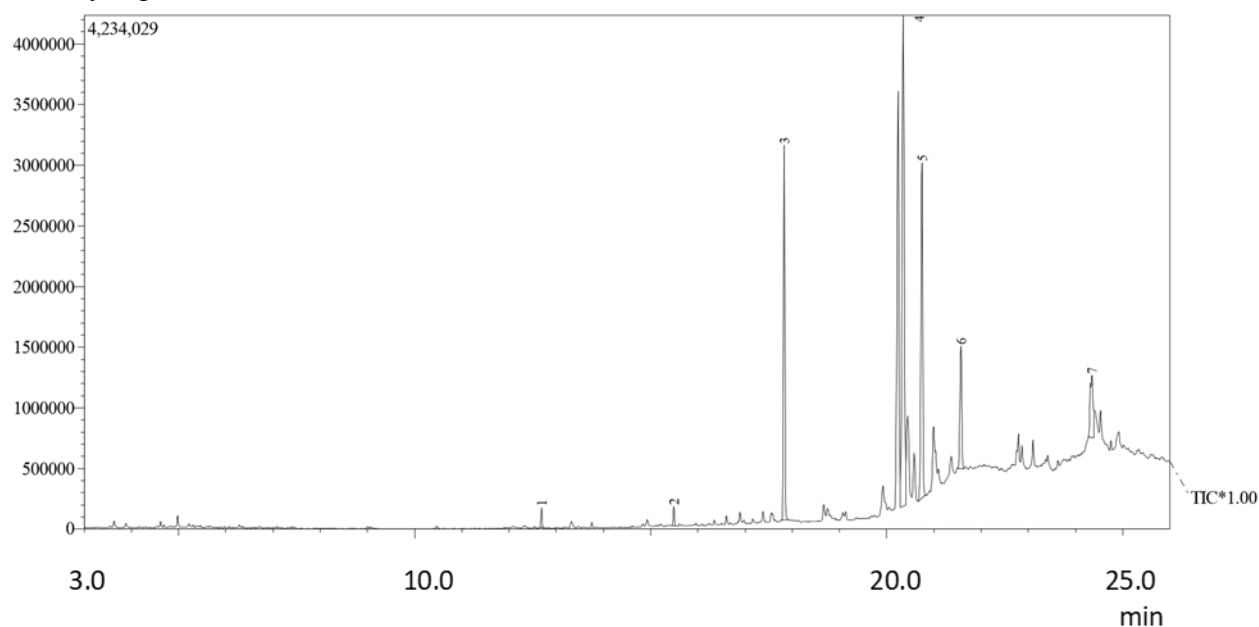


Fig. 1: GCMS of *Pterocarpus mildraedii* leaf

From Table 1, it is evident that peak 1. Indicated the presence of 0.94% of methyl 11-bromoundecanoate displaying a characteristic retention time of 12.69 minutes. The base peak was 74.05. Although this compound is present in a trace concentration. It is a useful precursor for the synthesis of the following compounds

- (i) Methyl 11-(2,5-dibromophenoxy)undecanoate, another precursor for the preparation of acetylenic cyclophanes.
- (ii) Methyl 11-[(1-phenyl-1H-tetrazol-5-yl)thio]undecanoate, which is a major

intermediate in the synthesis of emmyguyacins side chain. Methyl tridecanoate, which was present at a concentration of 0.91%, is a natural product that has been identified in other organisms such as *Aplysina*, *Mingholicus*, *Astragalus* and *Fistularis* (National Center for Biotechnology Information, 2022). It is a fatty acid methyl ester that was identified at a retention time of 15.492 minutes and was characterized by a base peak value of 74.00. At a retention time of 17.829 minutes, another natural product, methyl 14-



methylpentadecanoate was identified. This compound has a strong anti-antimicrobial activity and are also found in *Streptomyces malaysiense* and *Leonurus japonicus* (National Center for Biotechnology Information, 2022). It has also been reported at 6.43% in leaves of Omani neem by

Hossain *et al.* (2013). 40.50% of Methyl petroselinate was observed at a retention time of 20.351. it is an ester of essential oil and has also been reportedly found in other plant parts such as *C. cyminum* seed oil (Ramadan, 2020)

Table 1: Information deduced from the GCMS spectrum of *Pterocarpus mildraedii* leaf

Peak	Name of compound	Base peak	Retention time (minute)	%C
1	Methyl 11-bromoundecanoate	74.05	12.689	0.94
2	Methyl tridecanoate	74.00	15.492	0.91
3	Methyl 14-methylpentadecanoate	74.00	17.829	19.47
4	Methyl petroselinate	55.00	20.351	40.50
5	Methyl isoheptadecanoate	74.05	20.748	22.64
6	Methyl linolelaidate	74.00	21.574	8.56
7	\$ Methyl hexadecanoate	74.00	24.347	6.98

Ashraf *et al.* (2018) have also reported a 0.64% concentration of the compound in essential oil from *Daphne mucronate* stem. Methyl linolelaidate 8.56% of Methyl linolelaidate was observed at a retention time of 21.74 minutes. The compound is an essential oil and its presence in the leaf of the studied plant has also been reported by Uchegbu *et al.* (2015). Reasonable concentrations of this compound have also been found in *Leonurus japonicus* and *Ageratum conyzoides* (National Center for Biotechnology Information, 2022). However, in peak 7, the identified compound was 6.98% \$ Methyl hexadecanoate. It occurs naturally in *Lonicera japonica*, and *Zanthoxylum beecheyanum*. It has a strong antimicrobial activity.

4.0 Conclusion

The leaf of *Pterocarpus mildraedii* is a good sources of mineral and proximate nutrition. Its nutritional value is relatively comparable to other vegetables based on the analysed

parameters. The major phytochemicals in the leaf of the plants are methyl petroselinate, methyl isoheptadecanoate and methyl 14-methylpentadecanoate. Most of the identified phytochemicals are constituents of essential oil and some have been known for various biological activities.

5.0 References

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Conflict of Interest

The authors declared no conflict of interest

