INTRODUCTION

Aromatic plants are appreciated for their flavor in food seasoning or for their nutritive value and are used in traditional pharmacopeia because of their impressive therapeutic activities. These plants are a potential natural source of bioactive molecules and are the subject of rigorous scientific studies for their possible use as drug alternatives. Furthermore, they are also used in cooking as preservatives or colorants, and others.

Among this arsenal of aromatic plants, *Hua gabonii* Pierre ex De Wild is one of the less studied species of this group. *H. gabonii* is a small tree in the undergrowth of hygrophilic forests, quite common, having flowers that develop on the trunk and the large branches. The fruits contain big seeds, like a giant coffee cherry. This aromatic plant is in the family of Huaceae, order Violales, and class Magnoliopsida. It is called a Garlic tree and *lofiongi*, *longowu* (dialect, Tshopo district, Democratic Republic of the Congo).

Republic of the Congo). Its various parts (barks, leaves, fruits, seeds, leaves) are used in traditional medicine and especially in food as condiments. *Hua gabonii*, like the other species of the Huacaceae family, is restricted to West and Central Africa. The literature provides very little data on this plant and shows that the barks and fruits of this plant are rich in proteins and essential amino acids, showing that its fruits' extracts present an antioxidant activity. Hence, the importance of conducting in-depth investigations on this plant species. The objective of this paper is to contribute to the valorization of *H. gabonii*, a little-studied plant, by succinctly presenting data on its uses, chemical composition, and pharmacological properties to generate interest for further scientific exploration.

**LITERATURE SEARCH**

The databases PubMed, PubMed Central, Science Direct, Scielo, DOAJ, Science Alert, and Google Scholar were used to identify data on the use, chemical composition, and biological activity of *H. gabonii*. The plant's scientific name (*Hua gabonii*) is used as a keyword to identify published data regarding the plant. **Figure 1** shows various images of plant parts of *H. gabonii*.

![Figure 1. Different parts of H. gabonii. (a) fruits, (b) leaves, (c) roots, and (d) wood.](image)

**USE IN TRADITIONAL MEDICINE**

Different parts of *H. gabonii* (barks, leaves, fruits, seeds, leaves) are used in traditional medicine or food. **Table I** shows that different organs of *H. gabonii* are used mainly in food as condiments (leaves, seeds, and bark). This plant can be a source of flavorings or food additives for food, pharmaceutical, and other industries. Nowadays, the preference for natural flavors and colors over artificial ones is drawing attention because of the potential effects of artificial flavors. Moreover, this plant is sometimes used as a substitute for garlic or other aromatic plants such as *Scordophloeus zenkeri*. Furthermore, the young leaves of this species are eaten as vegetables and might be considered a source of nutrients. Some studies have shown that vegetables are essential for a balanced diet as they can provide nutrients to the organism. Singh et al. reported that besides their nutrient intake, vegetables are essential in combating various health disorders such as cancer, heart disease, high blood pressure, high cholesterol, diabetes, prostate problems, and others. In addition to using *H. gabonii* in food, this plant is also used in traditional medicine, even among the most used medicinal plants in the Democratic Republic of Congo. Its use in treating rheumatism and headaches predicts its anti-inflammatory or analgesic potential.

For several years, scientists from all over the world have primarily focused on the search for new anti-inflammatory molecules of natural origin. The risks of gastrointestinal toxicity of some classical anti-inflammatory drugs and the urgent need for new treatments or the poverty and high costs of classical anti-inflammatory drugs can explain this trend. Indeed, medicinal plants have gained an increasing interest in treating specific human pathologies due to their easy geographical accessibility and lower treatment costs. In 2002, the World Health Organisation (WHO) pointed out that traditional medicine is the primary means of care for more than 80% of the population in developing countries. Besides, plants can produce a wide variety of compounds that do not participate in their basic metabolism but rather represent secondary metabolite compounds, which can be used as a source of drugs with anti-inflammatory properties. Furthermore, it has been reported in **Table I** that the plant is used in the preparation of medicinal recipes to prevent abortion. Some sources in the literature mention infections as a cause of abortion. This approach can be explored to show the action
of extracts of this plant on bacteria involved in infections. Furthermore, the emergence of antibiotic-resistant bacterial strains is becoming an increasing concern\textsuperscript{32}.\textsuperscript{34}. Therefore, further scientific study of this plant can contribute to discovering new antimicrobials. Moreover, the small branches or wood of \textit{H. gabonii} are exploited in the Democratic Republic of Congo, particularly in the Tshopo district, to manufacture amonens in construction\textsuperscript{35}.

<table>
<thead>
<tr>
<th>Table I</th>
<th>Different uses of \textit{H. gabonii}.</th>
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</thead>
<tbody>
<tr>
<td><strong>Used parts</strong></td>
<td><strong>Uses</strong></td>
</tr>
<tr>
<td><strong>Bark</strong></td>
<td>Pieces of peel are added to vegetables and sauces; dried and crushed bark is added to sauces for seasoning</td>
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<td></td>
<td>Their extracts are used in traditional medicine against gastrointestinal disorders;</td>
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<tr>
<td></td>
<td>The bark tea with added pigment and small bitter eggplants is used to fight colds;</td>
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<tr>
<td></td>
<td>Bark extracts are also used in fumigations against rheumatism or headaches;</td>
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<td></td>
<td>Boil the bark in a pot with the bark of other trees, let it cool and give the decoction to the pregnant woman under threat of abortion to drink;</td>
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<tr>
<td></td>
<td>Bark extracts are also considered as fish poison</td>
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<tr>
<td><strong>Seeds</strong></td>
<td>The seeds are used in food to season dishes</td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td>In addition to their use as a condiment, the fruits (juice) are used for the treatment of amoebae;</td>
</tr>
<tr>
<td></td>
<td>They are also used as fish poison.</td>
</tr>
<tr>
<td><strong>Leaves</strong></td>
<td>The young leaves are eaten as vegetables or used as condiments; they are also used as a garlic substitute;</td>
</tr>
<tr>
<td></td>
<td>The leaves are added to the cooking vegetables;</td>
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<tr>
<td></td>
<td>The dried and crushed leaves and bark are prepared as tea;</td>
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<tr>
<td></td>
<td>In traditional medicine, these leaves are used for the treatment of cataract and intestinal disorders.</td>
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<tr>
<td></td>
<td>These leaves also stimulate dogs to hunt.</td>
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<tr>
<td><strong>Roots</strong></td>
<td>The roots are used against headaches or migraines</td>
</tr>
</tbody>
</table>

**CHEMICAL COMPOSITION**

The chemical composition of this species is described in Table II. \textit{Hua gabonii} is a source of nutrients. Abdou \textit{et al.}\textsuperscript{3} showed that \textit{H. gabonii} fruits have valuable contents of protein and some essential amino acids (valine, leucine, phenylalanine, tyrosine, and lysine). However, having shown that the barks of \textit{H. gabonii} have high contents of essential amino acids compared to fruits (41.31±0.1 g/100 g of proteins against 30.84±0.1/100 g) and that the amino acids as histidine, methionine, cysteine, threonine, and isoleucine are in great quantity in the barks compared to fruits. Tchiégang and Mblougueng\textsuperscript{40} reported that the fruits and peels of \textit{H. gabonii} did not have the same macronutrient composition. Indeed, the fruits' lipid, protein, and carbohydrate content are 1.40±0.05 g/100 g of dry matter, 13.61±0.03 g/100 g, and 60.20±1.0/100 g, respectively. While the lipid, protein, and carbohydrate content in the barks are 1.26±0.02 g/100 g, 10.82±0.02 g/100 g, and 24.08±0.20 g/100 g of dry matter, respectively. As for macronutrients, it is well known that carbohydrates are the primary energy source in the diet. The daily carbohydrate requirement is 400-500 g. As far as proteins are concerned, they constitute an important part of the protoplasm and are essential for the proper functioning of the body. The daily protein requirement is 60-70 g.\textsuperscript{39} Related to lipids, they are involved in the structure of the cell membrane or as calorie storage materials.\textsuperscript{39} We believe that \textit{H. gabonii} can be a source of essential amino acids and essential fatty acids mainly derived from the diet.

Tchiégang and Mblougueng\textsuperscript{40} also showed that \textit{H. gabonii} fruits and barks are a source of micronutrients such as phosphorus, iron, calcium, and magnesium. The content of phosphorus, iron, calcium, and magnesium in the fruits are 6.53±0.01 mg/100 g, 1.27±0.01 mg/100 g, 101.19±0.07 mg/g and 570.03±0.35 mg/g dry matter, respectively. At the same time, the content of phosphorus, iron, calcium, and magnesium in the barks is 0.60±0.01 mg/g, 9.59±0.85 mg/g, 2571.01±0.21 mg/g, and 2789.34±0.35 mg/g, respectively. Moreover, the barks and fruits of \textit{H. gabonii} are a source of fiber. The content of this nutrient is 4.59±1.31 g/100 g and 56.00±2.44 g/100 g dry matter in the fruits and barks, respectively. Different parts of this plant used
mainly as a condiment can, given its nutrient composition, contribute to the improvement of the physiological conditions of the organism. As far as minerals are concerned, they provide the organism with essential elements for protection and functioning and participate in specific metabolic reactions. Calcium and phosphorus play an essential role in the formation of the skeleton. Magnesium is involved in the composition of bones and neuromuscular functioning. Furthermore, the ionic balance of cells depends on the flow of sodium, calcium, potassium, and magnesium. On the other hand, iron makes up 33% of hemoglobin, which is involved in oxygen transport in the blood. In addition, fiber facilitates intestinal transit.

Bouba et al. has also shown that the seeds of *H. gabonii* have a high number of total polyphenols, flavonoids, tannins, and vitamin E compared to the bark. However, the study showed that the concentration of vitamin C is high in the barks. Polyphenolic compounds are known for their biological properties, notably their antioxidant, anti-inflammatory, and antimicrobial activities. Polyphenols, particularly flavonoids and tannins, are known to be toxic to microorganisms. Their mechanisms of toxicity are thought to be related to the inhibition of hydrolytic enzymes (proteases and carbohydrolases) or other interactions to inactivate microbial adhesins, transport, and cell envelope proteins. As for vitamins C and E, their role in the antioxidant defense system has been reported.

**Table II.** Phytochemical constituents of *H. gabonii*.

<table>
<thead>
<tr>
<th>Used part</th>
<th>Chemical phytochemical</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bark</td>
<td>Macronutrients and micronutrients</td>
<td>Bouba et al.</td>
</tr>
<tr>
<td></td>
<td>- Proteins and essential amino acids (histidine, valine, methionine, cysteine, threonine, isoleucine, leucine, phenylalanine, tyrosine and lysine) and non-essential ones (aspartate, glutamine, serine, alanine, proline, arginine, glycine), fatty acids</td>
<td>Bouba et al.</td>
</tr>
<tr>
<td></td>
<td>- vitamins C and E</td>
<td></td>
</tr>
<tr>
<td>Other compounds</td>
<td>Flavonoids, tannins</td>
<td>Bouba et al.</td>
</tr>
<tr>
<td>Fruits</td>
<td>Macronutrients and micronutrients</td>
<td>Bouba et al.</td>
</tr>
<tr>
<td></td>
<td>- Essential proteins and amino acids (valine, methionine, cysteine, isoleucine, leucine, phenylalanine, tyrosine and lysine) and non-essential ones (aspartate, glutamine, serine, alanine, proline, arginine and glycine) and fatty acids</td>
<td>Bouba et al.</td>
</tr>
<tr>
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<td>- Vitamins C and E</td>
<td></td>
</tr>
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</tr>
</tbody>
</table>

**BIOLOGICAL ACTIVITIES**

Poor literature characterizes the studies on the biological activities of *H. gabonii* extracts. Bouba et al. showed that the extracts of fruits and barks present an antioxidant activity. Many studies have reported the involvement of oxidative stress in the pathophysiology of chronic non-communicable diseases (cardiovascular diseases, cancer, diabetes, obesity, and others) and other diseases, such as sickle cell disease. Hence, the promotion of a diet that can provide antioxidants. Antioxidants are also known for their food-preserving properties. Several studies support using antioxidants from food and plant sources instead of synthetic antioxidants.

**CONCLUSION**

Certainly known for its medicinal or aromatic virtues, *H. gabonii* must be studied more. Studies highlighting its antimicrobial, anti-inflammatory, analgesic, and other properties are required, given the various uses of this plant in traditional medicine. It is also necessary to conduct in-depth studies to identify its active ingredients. In addition, the aromas derived from this plant also deserve to be studied and valorized. Lastly, toxicological studies to show the probable toxic effects of extracts from different parts of this plant used either in food or in traditional medicine are also essential.

**ACKNOWLEDGMENT**

None.
AUTHORS’ CONTRIBUTION

All authors have an equal contribution in carrying out this study.

DATA AVAILABILITY

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES


