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Research Article

Pharmacognostic Studies Of The Leaves And Root Of The Plant, *Tephrosia Vogelii* Hook F(Fabaceae)

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ABSTRACT

The leaves and root bark of *Tephrosia vogelii* Hook (Fabaceae) is also known as fish poison. The macroscopical examination of the whole leaf revealed the following; the colour is green, venation is pinnate, margin entire, apex is lanceolate, surface is hairy and texture papery. The microscopy of the leaf powder showed numerous unicellular covering trichomes with large lumen and long slits with tapering edges and broad base, abundant single fibres with two tapering edges and somewhat twisted lumen. Fragment of the lamina in transverse view revealed the leaf as a dorsal ventral leaf, composed

of double palisade. The upper epidermis is bigger and thicker than the lower epidermis with a parenchyma wall, spongy mesophyll, and spiral vessels. The histology of root powder revealed the presence of cork cells, calcium oxalate, fibre, parenchymatous wall, and simple starch grains. The phytochemical test showed the presence of carbohydrates, steroids, alkaloids, saponins, tannins, flavonoids and cardiac glycosides. Chemomicroscopical test revealed the presence of lignin, tannin, starch grains, calcium oxalate, proteins and oil glands in the leaves. The ethanol extractive value of the leaf is 2.8% while its water extractive value is 1.76%, meaning the leaf is more soluble in ethanol than water.

KEYWORDS: *Tephrosia vogelii*; Phytochemistry; Chemomicroscopy; Pharmacognostic study.

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Competing interest / Conflict of interest

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INTRODUCTION

Medicinal plants are the most ancient source of drugs for curing human and animal diseases. Their biological actions

recognized led to their cultivation in antiquity. Almost one quarter of all medicines are derived from 250,000 flowering plants on the earth surface though some of the secondary metabolites it contains may be toxic to lower beings or to man or

both. Their use in the crude or refined form enhances the effort aimed at integrating herbal with orthodox¹.

Tephrosia vogelii is a soft woody branching herb or small tree with dense foliage, 0.5-4m. Stems and branches tomentose with long and short white or rusty-brown hairs. Leaves are arranged spirally, imparipinnate. Flower is about 18-26mm long, fragrant when fresh and usually violet-purple or blue. Pod is linear, slightly turgid with brown or green woolly seeds which are ellipsoid to reniform. It is found in widely varying habitats including savannah-like vegetation, grassland, forest margins and shrub land, wasteland and fallow fields. It grows much better than *Leucaena leucocephala* in acid soils, forming root nodules and fixing atmospheric nitrogen while on poor soils; it grows more slowly and is prone to diseases.

Apart from its wide spread use as a fish poison, so many ethnomedicinal uses have been advocated. It is cultivated to serve as a medicament. The ground leaves and stem bark mixed with vegetable oil is used as part of medicament for bone setting, pieces of the stem are used to hold the broken limbs in position². Roots boiled in water when warm can be used to treat feet with localised fungal infections by immersing for some minutes³.

In East Africa the leaf is used as an abortifacient⁴. Hot water extract of the bark, leaf and unripe fruit has been used to induce abortion in pregnant women in Gabon⁶. In Cameroon hot water extract of the leaf is drunk to induce menses⁷.

The leaf macerate is purgative and emetic⁸. The crude methanolic extract of the leaves has shown to induce contraction of isolated rabbit jejunum⁹ and guinea pig ileum¹⁰ in a concentration dependent manner and this supports its use as a purgative. Pulped leaves and leaf sap obtained from the plant are used for ear ache in Tanzania and the root scrapings are applied to aching teeth¹¹.

In Angola the plant *Tephrosia vogelii* is used as a piscicide, anthelmintic, insecticide as well as for treating tuberculosis¹² and as a bactericide¹³. Its anthelmintic property is dose dependent¹². The roots are used to treat typhoid fever¹⁴. The plant has been known to have toxic and repellent effects against certain insect pests of stored grains¹⁵⁻¹⁹ supporting its widespread use by local farmers as a grain protectant. The plant can also be used as a rat poison by compounding with groundnut.

In Nigeria it is used as a seed dresser (insecticide/repellent) for cereals and legumes²⁰. It is applied directly to treat head lice, fleas, scabies and other ectoparasites^{20,21} fresh water snails have been found to be susceptible to extracts of crushed unboiled root which can be employed in combating schistosomiasis⁸.

MATERIALS AND METHODS

The plant, *Tephrosia vogelii* was manually collected from Vom, Plateau State (North-Central Nigeria) on the 24th March, 2011 and was identified in Federal College of Forestry, Jos Plateau state.

The morphological features of the leaves of *Tephrosia vogelii* were macroscopically examined. The powdered samples and the different histological/anatomical sections of the fresh leaf were treated and observed differently on microscope slides to ascertain the presence or absence of some chemical substances like starch, oils, proteins, tannins, lignin and calcium oxalate using appropriate chemical reagents and WHO specifications²². The root powder was similarly treated for its histological features and chemomicroscopy with the right chemical reagents. The water and alcohol soluble extractive values were also determined using the official methods of British Pharmacopoeia²³ and African Pharmacopoeia²⁴.

The ethanolic extract of the leaves and the root were separately subjected to preliminary phytochemical screening using the standard techniques²⁵⁻²⁸ to ascertain the presence or absence of plant metabolites such as alkaloids, cardiac glycosides, tannins, anthraquinones, steroids carbohydrates, flavonoids and saponins.

RESULTS AND DISCUSSION

Table 1. Showing the extractive values.

Extractive value	Leaf	Root
Water	1.76%	1.68%
Alcohol	2.80%	2.27%

Table 2. Showing the various phytochemical constituents of both the crude and the ethanolic extract of the leaf and root of *Tephrosia vogelii*.

Tests/Constituents	Crude		Ethanolic Extract	
	LEAF	ROOT	LEAF	ROOT
ALKALOIDS	+	+	++	+++

SAPONINS	++	+	+++	++
TANNINS	+++	-	+++	+
FLAVONOIDS	+++	-	+++	++
STEROIDS	+++	+	+++	+
ANTHRAQUINONE	+	-	-	-
CARBOHYDRATE	+	++	++	+++
CARDIAC GLYCOSIDE	+++	++	++	+++

KEY + = slightly present, ++ = moderately present, +++ = highly present, - = absent

From the macroscopical examination of the whole leaf of *Tephrosia vogelii*, the following were observed; the colour is green, venation is pinnate, margin entire, apex is Lanceolate, surface is hairy and texture papery.

The microscopical examination of the leaf powder revealed the presence of numerous trichomes which are of the covering unicellular trichomes with large lumen, long slits with tapering edges and broad base. Abundant fibres which occur usually as a single fibre with two tapering edges and somewhat twist lumen are present. Fragment of the lamina in transverse view showed that the leaf is dorsal ventral, composed of double palisade. However, the surface view of the lamina fragment showed that the epidermis is composed of cells with straight walls, and fairly numerous anisocytic stomata. The upper epidermis was also seen to be bigger and thicker than the lower epidermis. The leaf has a thick cuticle and with a spongy mesophyll and some group of conducting vessels like the spiral vessels. Calcium oxalate crystals mainly in the form of prisms were found scattered. They are not very abundant but are of various shapes and mostly of medium size. Starch grains were present as occasionally round granules which were found scattered. Few showed eccentric dot hilum with no visible striations. Parenchymatous wall was seen as occasional fragment of thick walled parenchyma of the midrib and larger palisades of the upper epidermis which are composed of longitudinally elongated cells.

The chemo-microscopy of the leaves indicated the presence of lignin, and tannins were found on the fibres and trichomes, Starch grains were found scattered as simple granules. Oils were present as round oil glands and prisms of Calcium oxalate was

found on fibres. Proteins were found to be present on leaves but absent in the root.

The alcohol extractive value (2.80%) is more than water extractive value (1.76%) signifying that the leaf is more extractible in the former than later. The soluble extractive value determination aids in the detection of exhausted drugs and identification of authentic drugs. The values are also useful for the determination of the amount of adulterants which yields matter to solvents which has little or no effect upon the drug itself²³.

The phytochemical results showed that it contains same constituents (alkaloids, saponins, tannins, flavonoids, steroids, carbohydrate and cardiac glycosides) though of higher yields in the extract particularly ethanolic extract than the crude. The presence of tannins and alkaloids may suggest its traditional use as localized fungal infection³, fish poison, and insecticide. The alkaloids may also suggest its traditional use as emesis while the purgative property may due to the presence of cardiac glycosides⁸. The traditional treatment of aching teeth could be due to the presence of flavonoids, and alkaloids. The presence of saponins and alkaloids in both the root and leaves may justify its ethno medicinal used as an abortifacient^{4,5}.

In conclusion, the pharmacognostic studies of the leaves of *Tephrosia vogelii* could serve as a useful monograph in the identification of the crude drug

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