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Full Length Research Paper

Ethnobotanical and phytochemical studies on some species of *Senna* in Nigeria

A.T.J. OGUNKUNLE* and TONIA A. LADEJOBI

Department of Pure and Applied Biology, Ladoke Akintola University of Technology, P.M.B. 4000, Ogbomoso, Nigeria.

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An ethnobotanical search on five species of *Senna* within and around Ogbomoso, Oyo State, Nigeria showed their relevance in the local herbal medicine. These plants include *Senna tora, S. occidentalis*, *S. alata, S. podocarpa* and *S. siamea.* The phytochemical screening of their leaves revealed some major groups of pharmacological importance including alkaloids, flavonoids, tannins, phlobatannins, saponins and anthraquinones. The study establishes some concordance between the local medicinal applications of the plants investigated and their constituent phytochemical groups which are relevant to the pharmaceutical industry. It presents the plants as potential sources of raw materials in the chemical and pharmaceutical industries. Lastly it confirms ethnobotany as a viable tool in search for plant genetic resources for use in the industries.

Key words: Ethnobotany, herbal medicine, medicinal plants, phytochemistry, *Senna.*

INTRODUCTION

A medicinal plant is one whose one or more of its organs contains substances that can be used for therapeutic purpose or which are precursors for the synthesis of useful drugs (Sofowora, 1982). Herbal medicine, which is the use of medicinal plants or drugs from medicinal plants in the treatment and cure of sicknesses and diseased conditions, has been with man since the beginning of time. In terms of recorded history (Osai, 1998), medicinal plants have been in use for the past fifty centuries, which until the last two and a half centuries was the main source of treatment to man and his domestic animals.

Early 20th century witnessed the arrival of hormones, chemotherapy, vitamins, antibiotics and more recently, the biotechnological products, which marked a sharp decline in the contribution of herbal medicine to health care delivery. Fortunately however, there is a revival of herbal medicine at the close of the 20th century (Osai, 1998). This is especially so with the rising cost of imported medication to the extent that governments imported medication to the extent that governments cannot meet the demands of the people. Moreover, the scarcity and cost of the commodities used to manufacture drugs locally have made modern medicine too expensive for the common man to afford. It is therefore important that we continually evaluate and develop our indigenous plant genetic resources for the improvement and sustenance of our health care delivery system.

On this background, the present study was intended to muster ethnobotanical information about the taxonomy, exploitation, utilization and cultivation of five species of *Senna* (family Leguminosae: Caesalpiniodeae) in Ogbomoso, Nigeria as well as to elucidate the chemical constituents of their leaves with a view to enumerating other potential areas of their utilization in the chemical and pharmaceutical industries.

MATERIALS AND METHODS

Plant materials

The vegetative and some reproductive parts of five species of *Senna* were collected at various locations in Ogbomoso, Oyo State, Nigeria (Table 1). These plant parts included the leaves, flowers, branches and fruits where possible. The identity of each of the

*Corresponding author. E-mail: atjogunkunle@yahoo.com.

species was authenticated at the Forest Research Institute of Nigeria (FRIN) in August 2000.

Ethnobotanical investigation

Interviews were conducted through a one-to-one discussion with 21 local residents who dealt in herbs. These included six herbal medicine men/women and fifteen herb sellers purposely selected for their popularity in their domains. The study area covered the five Local Government Areas in Ogbomoso namely, Ogbomoso North, Ogbomoso South, Orire, Ogo Oluwa and Surulere.

Portions of the plants under investigation were taken along to verify their vernacular names, the various medicinal uses to which the plants can be locally put, their modes of application and the extent of their cultivation and exploitation. The ethnobotanical information search strategy was designed as enumerated by Ford (1978).

Phytochemical analyses of the leaves

The phytochemical investigation on the leaves of the study plants were carried out partly in the laboratory of the Department of Pure and Applied Biology, Ladoke Akintola University of Technology, Ogbomoso and partly in the Department of Pharmaceutical Chemistry, Obafemi Awolowo University, Ile-Ife. Leaves were collected and air-dried in wooden trays for about 12 weeks in the New Biology Laboratory of LAUTECH, Ogbomoso. The dried leaves were then blended using a household electrical blender with an appropriate dry compartment. The leaf powder was stored sealed in five labeled reagent bottles for use in the investigation.
Alcoholic leaf extracts were prepared from the five plants as follows: A 10 g portion of the leaf powder was weighed into 100 ml of absolute ethanol. Extraction was effected at room temperature by placing the mixture (in covered beakers) in a cool dry place for 66 h. Also, water-ethanol extracts were prepared by measuring 10 g portions into beakers each containing 200 ml of water and ethanol in ratio of 1:1. The extraction was done under the same condition and timing as in the ethanol extraction. After appropriate hours of extraction, the filtrates were each concentrated to dryness using a rotary evaporator. The phytochemical assays for alkaloids, flavonoids, cardiac glycosides, tannins, phlobatannins, saponins, and anthraquinones were according to established procedures (Fairbairn, 1965; Wallis. 1967; Rai and Obayemi, 1973; Rai and Abdulahi, 1978; Aliyu and Nwude, 1982; Sofowora, 1986; Elujoba et al., 1989).

RESULTS AND DISCUSSION

Ethnobotanical information

Senna tora. and *S. occidentalis* both have the same medicinal uses except that the former is preferred for its potency. Their relative therapeutic potency probably informed their Yoruba nomenclature, *S. tora* being '*ako rere*', the prefix meaning male and *S. occidentalis* being *'abo rere'*, the prefix meaning female. Their roots are boiled with water and taken as tea for constipation. The plants are used for treating eczema and other skin defects caused by fungal infections by scrubbing the affected areas with the leaves and then leaving it to dry. The process is repeated for days until the infection disappears. The leaves are also prepared into vegetable soup i.e. *'aseje*' for small pox and measles. The soup is prepared with catfish (*Clarias sp*), palm oil and salt to taste. The *aseje* is taken once.

Both *S. alata* and *S. podocarpa* bear a common Yoruba name *'asunwon'*. While *S. alata* is referred to as '*asunwon oyinbo'*, the suffix meaning exotic or introduced species, and *S. podocarpa* is known as '*asunwon gidi*', the suffix meaning indigenous or native species. *S. alata* is used to cure skin disorders caused by dermatocytes. Thus, it is fungicidal. For this purpose, young leaves are plucked fresh and used to scrub the surface of the infected area. This process is repeated for three consecutive days. The flower buds are also collected, dried and powdered for use as purgative.

The leaves of *S. podocarpa,* our respondents claimed, are potent in curing gonorrhea and pile. The leaves are also employed to control insects and for treating fever. The gonorrhea concoction is prepared by blending fresh leaf buds with some water and squeezing out the juice. Potash (i.e. '*Kaun bilala'* in Yoruba) is added and the mixture is left to settle down, during which its colour will change from green to purple. The preparation is then administered by measuring a small cup for the patient(s) twice daily for three days. The leaves for curing pile are dried and ground together with its flower bud to make a powder. This preparation is administered as a mixture of one teaspoonful to a cup of warm '*ogi*', a staple beverage made from corn. The dosage is once daily for three consecutive days.

For the control of insects and insect pests, fresh leaves of *S. podocarpa* are blended to a paste and mixed with the local indigo dye the '*aro aso',* a leaf extract of *Indigofera* sp. (family: Papilionaceae). The blue-black mixture is rubbed on walls, door posts and floors to repel or kill insects such as termites, bed bugs and so on. The flowers of this plant form part of a concoction used to cure fever. The flowers are collected, dried and ground with chilly pepper or '*ata wewe abalaye'* (*Capsicum annum*; family Solanaceae), the fruit of *Xylopia aethiopica (e*eru; family Annonaceae*)* and half a pack of cubed sugar. The prepared powder is administered by measuring one teaspoonful into a cup of corn beverage *(ogi)* and drunk twice daily for three days.

S. siamea is called *'ewe kasia'* (Cassia's leaves) in Ogbomoso, Nigeria. This local name is pronounced much as *Cassia* the old generic name of the plant (Lowe and Soladoye, 1990). *S. siamea* is potent in treating fever. The bark of the stem is dried along with the fruit of *Xylopia aethiopica* and ground into powder. The mixture is administered as usual with warm '*ogi*'. The leaves have similar medicinal value. They are collected and dried along with lemon grass (*Cymbopogon citratus;* family Poaceae), pawpaw leaves (C*arica papaya;* family Caricaceae) and the leaves of lime (*Citrus lemonum;* family Rutaceae). This mixture is placed in a pot, covered with water and boiled for about one hour. The resulting 'tea' is

Table 1. Information about the *Senna* species investigated.

Name	Place of Collection	Date
Senna tora	Along a stream bank, Aguodo-Okelerin, Ogbomoso	30/07/2000
S. occidentalis	Along a steam bank, Aguodo-Okelerin, Ogbomoso	30/07/2000
S. alata	Within the premises of a residential quarters, Sabo, Ogbomoso	03/08/2000
S. podocarpa	Within the premises of a residential quarters, Sabo, Ogbomoso	03/08/2000
S. siamea	At the back of Industrial Training office, LAUTECH campus, Ogbomoso.	28/07/2000

Table 2. Phytochemical groups in the dried leaf extracts of some Nigerian species of *Senna*.

Phytochemical groups	Ethanol leaf extract					Water-ethanol leaf extract				
	St	So	Sa	Sp	Ss	St	So	Sa	Sp	Ss
Alkaloids	+	+	-	-	+	+	+	+	-	+
Flavonoids	-	+	+	+	+	-	-	-	-	-
Cardiac glycosides	-	-	-	-	-	-	-	-	-	-
Tannins	-	+	+	+	+	-	+	+	+	+
Phlobatannins	-	+	+	+	-	-	+	+	+	-
Saponins	+	-	+	+	-	+	+	-	+	+
Anthraquinones	-	-	+	+	-	-	-	+	+	-

*St = *S. tora*; So = *S. occidentalis*; Sa = *S. alata* ; Sp = *S. podocarpa*; Ss = *S. siamea* ; + = present; - = absent or not detected.

drunk by the patient while some of it is fetched for bathing.

The ethnobotanical investigation conducted showed that the five species of *Senna* have been actively involved in the local medicine in Ogbomoso, Nigeria. Silva et al, (1997) equally observed that extracts from *S. podocarpa* inhibited the growth of herpes simplex virus and African swine fever virus and their infections. This establishes the fact that the plant is virucidal. According to Gomes et al. (1997), *S. podocarpa* is widely applied by the Fulani traditional healers living at Contuboel region of Guinea Bissau to treat venereal diseases and its extract inhibited the growth of *Neisseria gonorrhoeae.* These buttress the points raised by the indigenous herbalists interviewed that the plant is used to prepare concoction for patients suffering from gonorrhea.

Our investigations further revealed that although *S. alata* and *S. podocarpa* are highly valued for their medicinal importance, they have not been so cultivated in the study area. This has made them, especially *S. podocarpa* to be scarce. *S. tora* and *S. occidentalis* are weeds growing mostly along river banks and waste lands. Out of these two, *S. tora* is more difficult to come by, but is of wider local medicinal applications than *S. occidentalis*. The root is dug up whole, washed clean of sand and prepared into a hot water concoction together with dried leaf sheaths of guinea corn (*Sorghum bicolor*) and some quantity of garlic (*Allium sativum*). One cup full of this concoction taken three times daily for six months effects a permanent cure to bronchitis asthma, said one of our respondents (Ajala, *pers. comm.*).

S. siamea is mainly ornamental, grown many years ago for shades around homes. All our respondents in the study area agreed that the leaves, stems, stem barks and root barks of *S.siamea* were under intense exploitation for medicinal and other purposes but with no attention to their replacement by planting. Ogunkunle and Oladele (2004) have also discovered that *S. siamea* was among the highly exploited tree species for timber and fuel wood in Ogbomoso with little or no sign of preparedness for its replacement.

Phytochemical groups in the leaf extracts

Table 2 shows the results of the phytochemical screening of the leaves of *Senna* species investigated. Based on the qualitative techniques adopted, no substantial differences were observed in the presence or otherwise of the phytochemical groups in the leaves of all the tree species between the ethanol extracts on one hand and the water-ethanol extracts on the other (Table 2). One notable difference as a result of the methods of extraction is the possibility that the alkaloids in *S. alata* are more water soluble, the reason why the presence of that group was not detectable in the pure ethanol extract. There is however the possibility that marked differences might exist between species and for the two methods of extraction if the chemical substances were determined in quan titative terms. Furthermore, where more than one test was conducted for the detection of a chemical group such as the alkaloids, no differences in the results were observed for the different tests (Table 2).

Out of the seven phytochemical groups investigated, six namely, alkaloids, flavonoids, tannins, phlobatannins, saponins and anthraquinones were detected in the leaves of the five *Senna* species. Cardiac glycosides were absent in all the species and for both methods of extraction. The leaves of *S. occidentalis, S. alata* and *S. podocarpa* each contained four or five phytochemical groups. Those of *S. tora* and *S. siamea* contained the least number of groups, being three at the most (Table 2).

S. tora according to Sofowora (1982) contains an antifungal substance called chrysophanic acid-9-anthrone that has been isolated. Our ethnobotanical search corroborates this claim in that *S. tora* was found to be actively employed in treating eczema, a fungal infection. *S. alata* contains anthraquinones (Bakare, 1998), a chemical group that has been implicated as a purgative and laxative. The findings of this study also revealed both the local usage of the plant for these purposes and the presence of anthraquinones in its leaf extracts and those of *S. podocarpa.* In the same vein, the results of Akinremi et al. (2000) from leaf and pod extracts support the fact that *S. podocarpa* contains anthraquinones and as such the plant is best known for its purgative and laxative activity.

Conclusion

This study shows that the five Nigerian species of *Senna* investigated are relevant to herbal medicine in Ogbomoso, Nigeria. There is also evidence to show some concordance between the local medicinal applications of the plants and their constituent phytochemical groups. The phytochemical groups detected in the dried leaf extracts of *Senna* studied are of importance in the chemical and pharmaceutical industries mainly because of their properties as either repellants or attractants of insects or of their industrial relevance. The plants are therefore potential sources of raw materials in these industries. However, further research efforts are needed to be able to specify their pharmacological implications in details. These clarifications would require thin layer chromatographic analysis and infrared spectrometry. Finally, this study, similar to earlier works (Ford, 1978; Oladele, 1988) has confirmed ethnobotany as a vital tool in the preliminary search for plant genetic resources for use in the chemical and pharmaceutical industries.

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