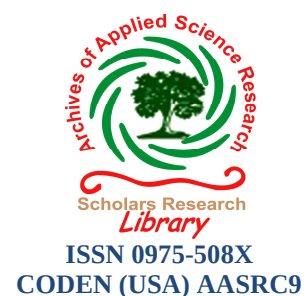




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Ethnobotanical survey of medicinal plants used to treat gastrointestinal parasites in human and livestock in four geographic areas of Burkina Faso (West Africa)

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ABSTRACT

*In four (4) areas (Bobo-Dioulasso, Boni, Fada-N’Gourma and Pobé-Mengao) belonging to three (3) regions of Burkina Faso, a survey of medicinal plants used by traditional healers for treatment of gastrointestinal parasites in both human and animals has been carried out from 2005 to 2006. Interview approach was used to document indigenous knowledge and uses of plant species as remedies. A total of 58 traditional healers constituted of 79.3% by men and 20.7% by women were interviewed for their knowledge on the use of plants for the treatment of gastrointestinal (GI) parasites. 12, 16, 18 and 12 respondents were met respectively at Bobo-Dioulasso, Boni, FadaN’Gourma and Pobé-Mengao. Twenty five (25) plants used in both humans and animals have been reported. 36 % of these plants are commonly used in all the 4 study sites for the treatment of gastrointestinal parasites. Results obtained showed that *Cassia sieberiana*, *Anogeissus leucocarpus*, *Daniellia oliveri*, *Balanites aegyptiaca*, *Sabalenegalisensis*, *Securidaca longepedunculata*, *Senna alata* and *Accassianilotica* var. *adansonii* were the most cited plants. *Cassia sieberiana*, *Balanites aegyptiaca*, *Daniellia oliveri*, *Zizyphus mucronata* and *Accassianilotica* var. *adansonii* were the most used plants for animals. Leaves and root bark were the main plant parts used when decoction was the main mode of preparation of the remedies.*

Key words: Medicinal plants, gastrointestinal parasites, traditional healers, Burkina Faso.

INTRODUCTION

Intestinal parasites affect more than 1 billion people and are the cause of 155000 deaths annually. These diseases are in general widespread in tropical regions and their high frequency represents more than 40% of tropical health problems excluding malaria [1]. Both in human and animals, they are the causes of high mortality and reduced productivity, in particular in developing countries where hygiene and sanitary conditions are poor.

In human, helminthiasis is a major constraint to productivity, manpower and working capacity of adults; it also reduce growth and mental development of children leading to increased poverty [2]. In animals, parasites constitute a major problem. For example in Nigeria, small ruminant’s productivity losses due to parasites were estimated above at least 9 billion CFA annually [3]. In Burkina Faso where small ruminants holding contributes to improve the living conditions of rural populations, the occurrence of helminthiasis is very high and close to 100% of the herd during the rainy season [4][5][6]. Then, this infection rate is a major obstruction to the productivity of the livestock sector. In human, a study conducted by Cissé [7] among public health centres of Burkina Faso revealed a global prevalence of gastrointestinal parasites infections of 54.7%.

Unfortunately, rural populations have limited access to health services and to antiparasitic substances used for GI parasites control, due to poverty. On another hand, most of the existing drugs produce side effects such as abdominal pain, loss of appetite, nausea, vomiting, head ache and diarrhea[8]. Thus, they use traditional medicine and pharmacopoeia without any side effects[9] as alternative to modern drugs supply for their care. Numerous plants are used as remedies with antiparasitic properties both in human and animals [10][11][12].

In this study, a survey was performed with the aim to carry out an inventory of natural plants used for preparation of remedies against GI parasites by the healers in four (04) areas within 3 regions of Burkina Faso.

MATERIALS AND METHODS

-The study sites

The survey was carried out from May 2005 to January 2006 in the 4 towns and their surroundings within 3 regions of Burkina Faso: Bobo-Dioulasso and Boni in the Hauts - Bassins Region, (wet to sub-humid climate), Pobe-Mengao (Sahel Region, dry and harsh areas) and FadaN'Gourma (East Region, sudanian climate) (figure 1).

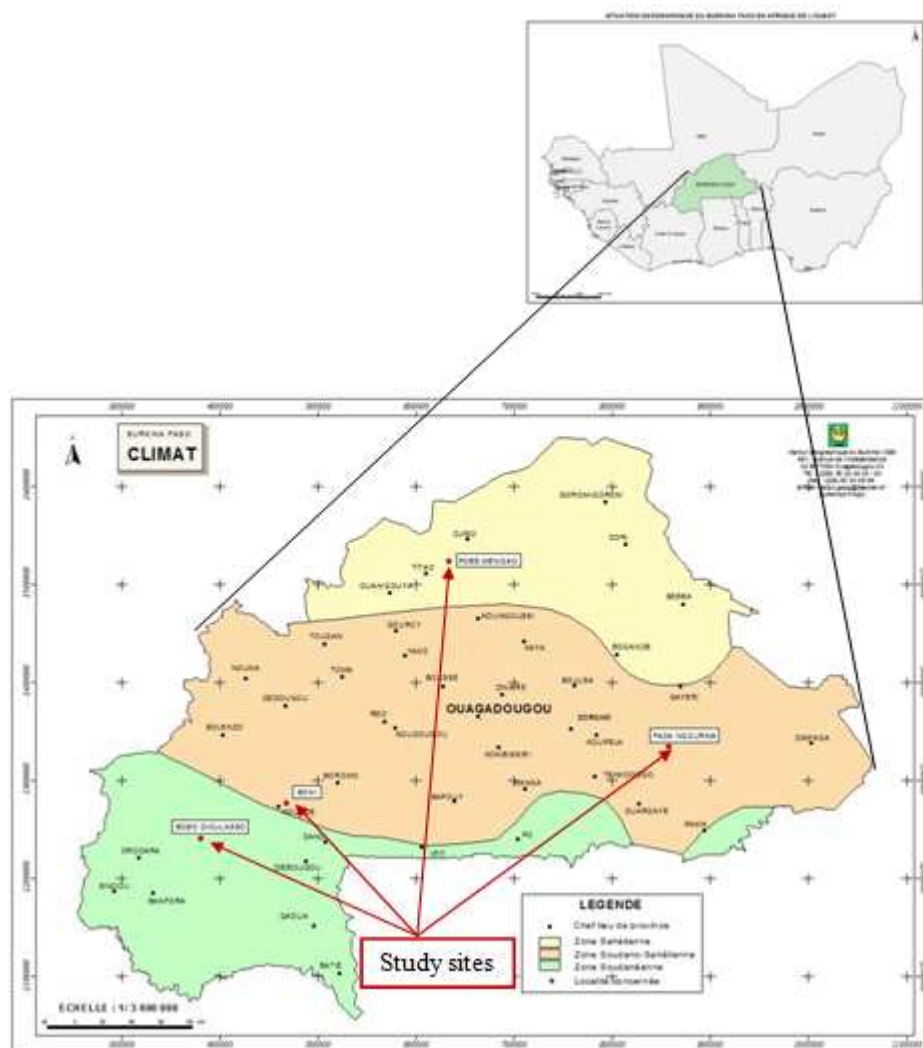


Figure 1 Maps showing the location of Burkina Faso in the West Africa region (upper part) and the geographical location of the 4 study sites in Burkina Faso where the surveys were conducted (lower part)

The Hauts Bassins region is located in the west of the country. It covers 25 479 Km² and has 1 352 781 inhabitants. The climate is of tropical north-sudanian and tropical south sudanian type. The region is marked by 2 main seasons: a rainy season from May to October and a dry season from November to April. The main economic activities are agriculture, livestock holding, handcraft and tourism[13].

Located in the north of the country, Sahel Region covers 36 166 km² and has 912796 inhabitants. The climate is of sahelian and Sudan – sahelian type. The dry season is about 9 months (from October to June) and the temperatures reach 43°C and above. The rainy season is about 3 months (from July to September). The main activities of the populations are agriculture, livestock holding and handcraft [14].

The East Region is located in the East part and covers 46 694 km² with a total population estimated at 1 137 744 inhabitants. The climate is the south - sudanian type. The dry season is about 7 months (from October to April) and the rainy season is about 5 months (from May to September). Agriculture and livestock holding (21.8 % of the national livestock) are the main activities in this region [15].

-Field survey

Surveys were conducted to collect information from traditional healers in the 4 sites. A structured questionnaire was used. Collected information carried on data on the farmer's profile, the plants used to treat GI parasites, the parts used and the mode of preparation and application of the remedies. In addition, the healers were asked about their general understanding of the clinical signs associated with gastrointestinal (GI) parasites infections.

In each area, traditional healers are organised in associations. A group meeting was arranged where the healers were informed about the background and the purpose of the study in their local language with the help of interpreters. After, the healers who agreed to respond to the questions were met individually in their home and then interviews were conducted with them.

A field work was organised and the plants cited during the interview were collected with the aid of informants and identified first on the field of collection. This determination was later confirmed at the herbarium of the "Centre National de la Recherche Scientifique et Technologique (CNRST)" where vouchers are deposited.

All data obtained from this study were subjected to simple descriptive statistics calculating frequency counts and percentages. A frequency (F) of citation of the plants was calculated by using the formula:

$$F = (\text{Number of healers who cited the plant} / \text{total number of the healers interviewed}) \times 100.$$

RESULTS

- Farmer's profile

In the survey, 58 persons have been met; with a repartition of 12, 16, 18 and 12 respondents at Bobo-Dioulasso, Boni, Fada N'Gourma and Pobé-Mengao respectively. There were a large number of men (79.3%, n = 46) compared to women (20.7%, n = 12). The respondents were 45 -65 years old. The main activities of the healers were agriculture (48.27%, n = 28), livestock holding (29.3%, n=17), home women (20.7%, n=12). One person (1.7%) was a retired paramedic.

- Clinical signs

The major clinical signs the healers considered as related to GI parasites infections in humans were stomach ache, ocular observations of worms like guinea worm and/or presence of tapeworm segments in the faeces as well as the presence of blood in the faeces and/or diarrhoea. In livestock, the respondents considered as major clinical signs of GI parasites infections when the animal did not graze and / or have diarrhoea.

- Plants used

Cumulatively, twenty five (25) medicinal plants of eleven (11) families were used in the 4 sites for the treatment of GI parasitosis in human and/or in livestock. The most cited plant (43.10 %) was *Cassia sieberiana* D.C. (CAESALPINIACEAE). The parts used, the indications, the preparation and application of the plants products and the frequency of citation of the plants during the survey are summarized in table 1.

Table 1: Plants used for the treatment of gastrointestinal parasites in the 4 study sites in Burkina Faso.

Name / family	Voucher N°	Parts used	Indications	Mode of preparation / Application	Frequency (%)
<i>Accassianilotica</i> var. <i>adansonii</i> (Guill. et Perrott.) O. Ktze / MIMOSACEAE	HNBU00210	F, Sb	Intestinal worms, Diarrhoea, dysentery (in human and livestock)	Decoction of stem bark (human), Dried fruit powder (livestock) / oral	20.69
<i>Adansoniadigitata</i> Lin. / BOMBACACEAE	HNBU00169	Sb	Guinea worm	Burn the plant part / apply locally on the painful site	05.17
<i>Annonasenegalensis</i> Pers. / ANNONACEAE	HNBU00168	Rb	Dysentery, Intestinal worms	Maceration /oral	06.89
<i>Anogeissusleocarpus</i> (D.C.) Guill. et Perrott. / COMBRETACEAE	HNBU00185	L, F, Sb	Tapeworm, Guinea worm	Decoction; burn and apply the charcoal powder (Guinea worm) / oral, local application	39.65
<i>Balanitesaegyptiaca</i> (L.) Del. / BALANITACEAE	HNBU00165	Rb, S	-Intestinal worms in human and livestock, -fever in livestock	-Mix the seed powder with millet powder/ oral -Maceration or decoction of Rb or S/oral	24.13
<i>Capparis corymbosa</i> Lam. / CAPPARIDACEAE	HNBU00663	Sb	Guinea worm	Burn and reduce in powder/apply the charcoal on the painful site	03.44
<i>Cassia sieberiana</i> D.C. / CAESALPINIACEAE	HNBU00179	Rb	Dysentery, intestinal worms in human and livestock	Maceration / oral	43.10
<i>Combretum nigricans</i> Lepr. / COMBRETACEAE	HNBU00188	L, Rb	Diarrhoea	Decoction / oral	05.17
<i>Daniellia obovata</i> (Rolle) Hutch et Dalz / CAESALPINIACEAE	HNBU610	Sb, L	Dysentery, gastroenteritis, intestinal worms in human and livestock	Decoction /oral	29.31
<i>Detarium microcarpum</i> G. et Perr. / CAESALPINIACEAE	HNBU00340	Sb	Dysentery	Decoction / oral	06.89
<i>Diospyros mespiliformis</i> Hochst. / EBENACEAE	HNBU00969	L	Dysentery	Maceration / oral	03.44
<i>Feretia aponanthera</i> Del. / RUBIACEAE	HNBU02176	Rb, L	Stomach ache, dysentery	Decoction / oral	03.44
<i>Guiera senegalensis</i> J.F Gmel. / COMBRETACEAE	HNBU00252	L	Stomachache, dysentery	Decoction / oral; chew the leaves and swallow the juice	17.24
<i>Kaya senegalensis</i> Juss / MELIACEAE	HNBU00295	L	Intestinal worms	Maceration /oral	06.89
<i>Lannea acida</i> A. Rich. / ANACARDIACEAE	HNBU00139	Sb	Dysentery	Decoction / oral	01.72
<i>Lannea microcarpa</i> Engl. et K. Krausse. / ANACARDIACEAE	HNBU00141	Rb	Dysentery, venom detoxifying	Maceration /oral	06.89
<i>Leptadenia hastata</i> (Pers.) Decne. / ASCLEPIADACEAE	HNBU00403	Rb	Stomach ache	Decoction /oral	01.72
<i>Prosopis africana</i> (G. et Perr.) Taub. / MIMOSACEAE	HNBU00199	Sb	Dysentery	Decoction / oral	01.72
<i>Pterocarpus erinaceus</i> Poir. / PAPILIONACEAE	HNBU00284	Sb	Diarrhoea, intestinal worms	Decoction / oral	01.72
<i>Sabiasenegalensis</i> (A.DC.) Pichon. / APOCYNACEAE	HNBU00223	L	Stomachache, dysentery	Decoction/ oral	24.13
<i>Sapium grahamii</i> (Hochst) Pax. / EUPHORBIACEAE	HNBU01032	Rb, L	Guinea worm, intestinal worms	Decoction /oral	10.34
<i>Securidaca longepedunculata</i> Fresen. / POLYGALACEAE	HNBU00299	Rb	Guinea worm	Decoction / Cutaneous (apply the extract on the painful site)	24.13
<i>Senna alata</i> (L.) Roxb. / CAESALPINIOIDEAE	HNBU00176	L	intestinal worms, malaria	Decoction /oral	20.69
<i>Ximenia americana</i> Linn. / OLACACEAE	HNBU01780	Rb	Dysentery	Decoction / oral	05.17
<i>Zizyphus mucronata</i> Willd. / RHAMNACEAE	HNBU02139	Rb	Stomach ache in livestock	Maceration / oral	03.44

F = fruits, L = leaves, Rb = roots bark, S = seeds, Sb = stem bark.

Most of the plants are used separately. The plants parts widely used by the healers are the roots and leaves (45.45%). Decoctions with water are the predominant modes of preparation of the plants products (72.7%) and the oral route is used as the main administration way (90.9%). The dosage of a remedy depends on the age of the patient and was 60 -1000 g /l for adults. In general, children have small quantities (30 -250 g/ l).No interdicts was said to be required during the treatment.

DISCUSSION

Most of the interviewed healers were men. Generally,they use their knowledge on medicinal plants to help the community by selling their products to the patients. The few women interviewed in this survey were also organized in associations. The major signs considered as being due to GI parasites infections were stomach-ache, diarrhoea, the presence of the worms and blood in the faeces.36% (n = 9) of the plants reported are widely known and commonly used in all the 4 sites for the treatment of GI parasitism.

In the study, there were various methods of preparation and application for the different types of remedies identified. Also, various preparations forms were observed like infusion, maceration, decoction, fresh application, powdering, chewing. However, there were few consistencies in the parts used, the indications and the mode of preparation of the plants products from a site to each other. For example, the seeds of *Balanitesaegyptiaca* are used at Bobo-Dioulasso and Boni against intestinal worms while, for the same purpose the decoction and the macerate of the root bark is used at Fada-N’Gourma and Pobé-Mengao, respectively.

Only *Cassia sieberiana* roots bark were prepared the same way and used for the same indications in the 4 sites. Additionally, only *Sapiumgrahamii* was used in both Bobo-Dioulasso and Boni for the same specific indication. The plants parts were used separately but sometime, traditional healers also used some ingredients such as milk to prepare the remedies. Thus, *Accassianilotica* product could be add to milk when *Sennaalata* should be mixed in *Tamarindusindica* juice.

Among the plants we reported, *Anogeissusleiocarpus*, *Annonasenegalensis*, *Balanitesaegyptiaca* are known in the literature to be effective against helminthiasis [3][10][12][16]. *Securidacalolongepedunculata* is used against diarrhoea, dysentery, intestinal worms, and malaria. The leaves decoction of this plant is used as a detoxifying of snake bites [17] while the leaves extracts of *Sennaalata* is used in Côte d’Ivoire to treat bacterial infections related to *E. coli* and *C.albicans* [18]. The trunk bark decoction of *Danielliaoliveri* is used against skin diseases. This plant is also indicated for the treatment of human and ruminant’s gastrointestinal worms and as anthelmintic [11][12]. *Guierasenegalensis* has been known to have antitrypanosomiasis properties and used as venom detoxifying. When burnt in animal house, the dried leaves of this plant elicited insecticide properties [19]. *Cassia sieberiana* is used for abdominal pains, guinea fowl peste and dewormer and laxative [17]. *Sabasenegalensis* seeds are used against stomach aches, dysentery, diarrhoea and food intoxications. *Sapiumgrahamii* is known to be very toxic. A decoction of the whole plant is used as a bath to treat skin affections and edema, and is taken internally to treat skin affections, including leprosy and ascites. An extract of the pounded leaves is applied to guinea worm sores or a few drops of the latex are applied to the sore to help to extract the parasite.

This survey underlines that 25 plants species were used to treat GI parasites infections and the symptoms that might be related to GI parasites. Therefore, there is a realistic potential that these plants would contain compounds with antiparasitic potency. In our present study, the results reported are preliminary findings. For the improvement and promotion of the local traditional knowledge using medicinal plants against GI parasites, there is the need to investigate the phytochemical, pharmacological and toxicological profile of the plants used in order to ensure their efficacy as well as their safety. Specially, anthelmintic trials should be carried out to assess the efficacy of the inventoried plants on GI parasites.

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