

Medicinal Plants used in Traditional Medicine in the Centre East Region of Burkina Faso

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Abstract: The present research focused on the inventory and the use of plants in traditional medicine for the treatment of diseases in this area. The method was based on ethnobotanical surveys with semi-directing interview, conducted from November 2006 to December 2007 among a sample of 50 people aged between 40 and 80 years and very experienced in traditional medicine in the municipalities of Bissiga, Lalgaye and Tenkodogo. We identify 73 phylogenetic species and 175 therapeutic indications used to treat 52 diseases and the principal ones are the gastrointestinal diseases, the malaria, the various fevers, the jaundice, the skin diseases, the respiratory affections, the reproduction diseases, the hemorrhoids and the infantile diseases. In traditional veterinary pharmacopoeia, 18 phylogenetic species are used with 33 therapeutic indications to treat diseases including trypanosomiasis, tuberculosis, diarrheas and wounds. The interest of people of this area for medicinal plants, command a special attention to organize the actors and preserve the plant genetic resources.

Key words: Traditional medicine, therapeutic indications, medicinal plants, Burkina faso

INTRODUCTION

The phylogenetic resources were strongly important in the life of the men who have always made recourse to them to satisfy the majority of their needs as well as the food or medicinal. This recourse to the plants, formerly anchored in the culture of the African populations was controlled and forbidden after independence to the profit of conventional medicine known as modern (Burkina Faso, Ministry of Health, 2000).

Moreover, since the monetary devaluation of the FCFA in 1994 and in spite of the advent of the generic drugs, many medical treatments remain financially expensive and inaccessible to the African populations whose great majority is economically helpless. In the inability to achieve the medical structures, these populations continue to seek essential remedies from medicinal plants (Bellakhdar, 1983; World Health Organization, 2002; Paré *et al.*, 2009). In 1994, Law No. 23/94/ADP Code of Public Health of 19 May 1994 acknowledges Medicine and traditional medicines as a component of the national health system (Burkina Faso, Ministry of Health, 2004).

Like most of the other African countries, the pharmacopoeia and traditional medicine are increasingly

used in Burkina Faso. According to the Centre d'Analyse des Politiques Economiques et Sociales (2004), 90% of the population of Burkina Faso, generally use traditional medicine for treatment.

Thus, to document and develop this traditional knowledge, various research were undertaken by Adjanohoun *et al.* (1979), Lejoly (1991), Merel *et al.* (2004), World Health Organization (2007), Ibara *et al.* (2007) and Couliadiati *et al.* (2009). In Burkina Faso, these research works concerning medicinal plants and traditional medicine have been done in the center region (Palé *et al.*, 2004; Belem *et al.*, 2006; Yélémou *et al.*, 2007) in the West (Ræbild *et al.*, 2007; Olivier *et al.*, 2003) and in the North-West (Zerbo *et al.*, 2007). The majority of these works consisted on the inventory of medicinal plants and the Center East Region has not yet been explored.

The veterinarian pharmacopoeia has also been studied by Tamboura *et al.* (2000) and Tapsoba and Deschamps (2006). However, many regions are not yet explored. This is why; we chose to study the medicinal plants of human and veterinary pharmacopoeia from the Center-East Region of Burkina Faso. Some work are about the description of the plant group and some uses of plants for food and energy (Kéré, 1998; Ky *et al.*, 2009)

have been done but no work about the use of medicinal plants of this region. Present study aims to identify and list the various plants used in pharmacopoeia and traditional medicine in the study area. It also aims to establish the situation of the therapeutic treatments used by the different actors in the purpose and objective of improving the health of populations as well as animals in the studied zone. This will contribute to a best development of the phytogénétique resources in terms of health in the area and also provide credit to local and traditional knowledge.

MATERIALS AND METHODS

The study was conducted from August 2006 to April 2007 in a zone located in the eastern central region of Burkina Faso. This region is located between longitudes Western 1°0' and 0°45' and the latitudes 12°35' and 10°55' Northern. It covers a surface of 14.656 km⁻² (Fig. 1). According to the new administrative map, it is limited to the East by the East Region, to the North by the Center-North Region, to the West by the Center-South Region, to the North-West by the Central Plateau Region and to the South by the republics of Togo and Ghana. The region Center-East is composed by 3 provinces: Boulgou, Kouritenga and Koulpélogo. It is subdivided in 30 communes including 6 urban and 24 rural. Several ethnic groups cohabit in the zone: Mossé, Bissa, Yanna,

Zaosé and Peulh. Its border position with Ghana and Togo makes this area, a transit commercial and cultural zone. The population of Center-East of Burkina Faso in 2006 was about 1.132.023 and 70.91% was living in the provinces of Boulgou and Koulpélogo. The climatic situation is characterized by an monthly average temperature between 17.5° and 26.6°C in 2006 and an annual rainfall of 800 to 1.200 mm (Burkina Faso, Ministry of Economy and Development, National Institute of the Statistics and Demography, 2007).

Methodology: The methodology used is based on the ethnobotanical surveys using a semi-directing interview with questionnaires and interview guides elaborated beforehand (Foster and Anderson, 1978; Cotton, 1996; Peters, 1996). The questions were put in the two most spoken local languages: Mooré and Bissa. All of the other ethnic groups living in the study area understand Mooré. An interpreter explained us all the significances of the local words, mimes and proverbs in Mooré or Bissa. The 50 interviewed people were 40-80 years old and are recognized by the populations for their great experiences and knowledg in traditional medicine.

The data were collected on cards previously developed based on the different scientific themes and searched. They contain the information relating to the names of the plants, the organs used, the mode of preparation, the therapeutic indications, the mode of

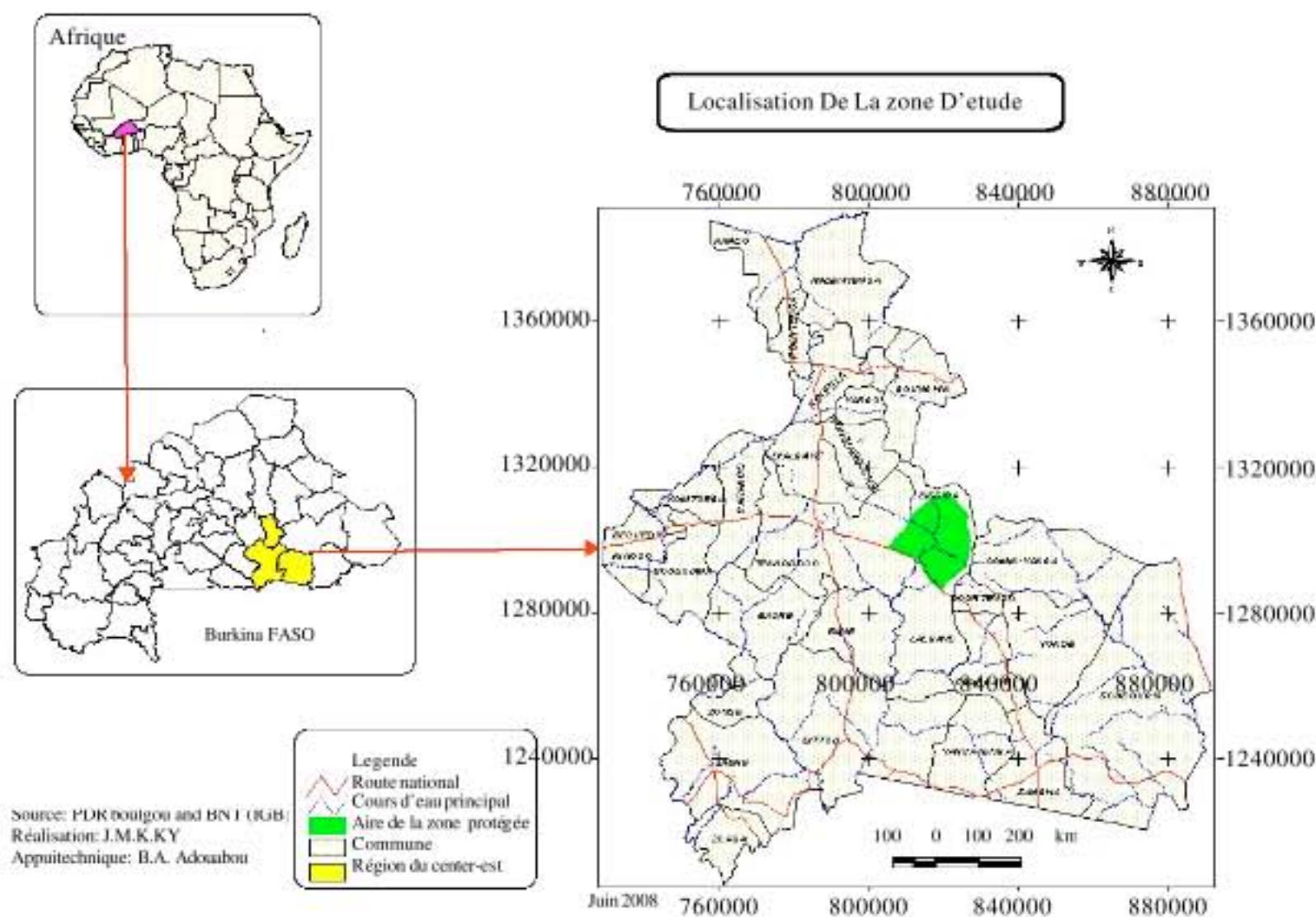


Fig. 1: Map of localization of the study zone in the Center East of Burkina Faso

administration and the socio economic data. The first questionnaire was intended to the traditional therapists, salesmen (its) or consultants or prescribers of drugs and the second one was addressed to the traditional stockbreeders or veterinary. The Third one was used to receive information of socio-economical order.

The surveys were conducted from November 2006 to December 2007. They were conducted in 8 villages from 3 municipalities (Bissiga, Lalgaye and Tenkodogo) when traditional human and veterinary medicine are practiced by local specialists with great experience and recognized by opinion leaders and notables of the villages.

The scientific identification of the species was carried out at the Laboratory of Plant Biology and Ecology of the University of Ouagadougou under the supervision of Professor Jeanne MILLOGO-RASOLODIMBY. The species collected were compared with those of Herbarium AUO (African Union Organization) of the University of Ouagadougou. The listed and identified species was compared with that of the Catalogue of the Vascular Plants of Burkina Faso (Lebrun *et al.*, 1991) and of the floristic lexicons of Von Maydell (1983), Arbonnier (2000) and Bosch *et al.* (2002)

RESULTS

We counted 73 species of 59 genera and 36 families. Sixty three are woody species and 10 plants are herbaceous (Table 1).

The plant bodies used (Fig. 2) are: leaves (Fig. 2a), stem bark (Fig. 2b), rhizome, roots or its bark (Fig. 2c), fruits (Fig. 2d), Stems herbaceous (Fig. 2e), fruits and seeds (Fig. 2f), gum and latex.

The decoction, the aqueous mashing, the aqueous infusion, the calcination and the grinding are the principal modes of preparation of traditional remedies.

The drinking, the bath, the enema, the massage, the fumigation, the inhalation, the instillation, the application and scarification are the main modes of traditional drug administration.

We have identified 175 therapeutic indications used by the traditional medicinal practitioners and 93% of the medical recipes were products of phytogenetic woody species.

In the studied zone, 52 diseases treated by the traditional medicine practitioners were listed. They are gathered in 16 groups of diseases. The main diseases are related to the gastrointestinal diseases, the malaria, the various fevers, the jaundice, the wound and skin diseases, the infantile diseases, the respiratory diseases, the meningitis, the hemorrhoids and the reproduction diseases (Table 2).

Table 1: Table of variation of the number of species per families, genera and number of treatments

Vegetation type	Families No.	Genus No.	Species No.	No. of therapeutic indications
Woody	26	49	63	138
Herbaceous	10	10	10	37
Total	36	59	73	175



Fig. 2: Some plant bodies used in pharmacopoeia and traditional medicine: (a) Sale of *Maytenus senegalensis* leaves in the market of Tenkodogo; (b) Roots of various plants in the market Garango; (c) Bark and roots of various plants in the market of Tenkodogo; (d) Fruits of *Tamarindus indica* for sale in the market of Tenkodogo; (e) Various parts of woody plants and herbs on sale in the market Tenkodogo and (f) Shea butter (*Vitellaria paradoxa* manufactured in Sector 5 of Tenkodogo)

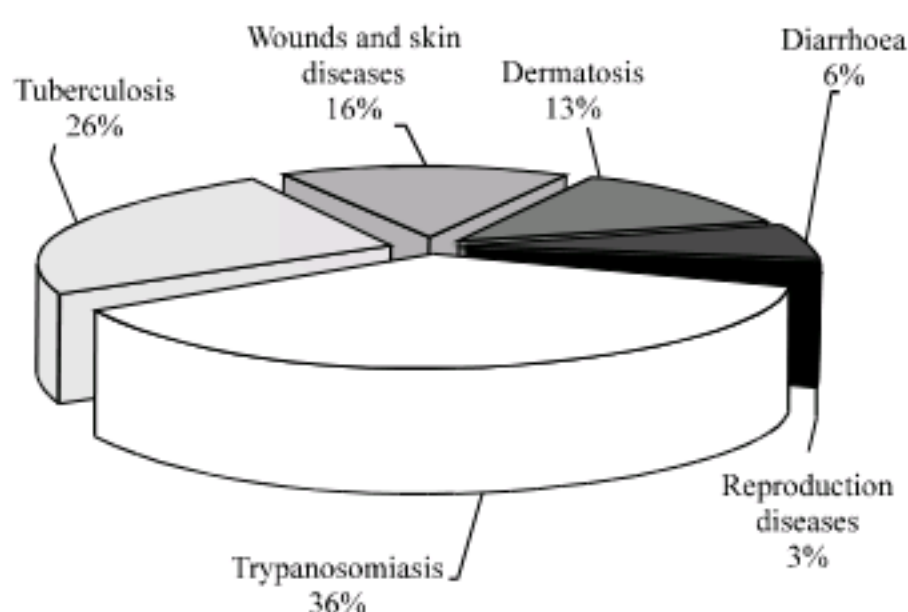


Fig. 3: Proportion of the diseases treated in pharmacopoeia veterinary

Table 2: Table of the various groups of listed diseases and therapeutic indications in human pharmacopoeia

Applications medical	No. of therapeutic indications
Respiratory disease	9
Headaches	8
Genital and reproduction disease	6
Skin disease	15
Leprosy	6
Parasitic infection	6
Gastrointestinal disease	10
Renal disease	26
Malaria, jaundice and fevers	28
Heart and circulatory disease	6
Haemorrhoids	9
Infantile disease	11
Asthenia	8
Dental and larynx disease	11
Meningitis and other disease	16
Total	175

We also identified 18 woody species used in the traditional veterinary medicine. These species are distributed in 16 genera and 11 families.

The leaf, the stem bark and the fruits are the main plant bodies used. The modes of preparation of the medical recipes are mainly based on the decoction, the aqueous infusion and grinding. The modes of administration used are the drinking, the rectal injection, the bathing and the local application. In the studied zone, thirty three therapeutic indications of medicinal plants have been identified with traditional medicine practitioners interviewed. These plants are used for the treatment of trypanosomiasis, bovine tuberculosis, various wounds, fractures, diarrheas and nodular dermatosis (Fig. 3).

DISCUSSION

Present results showed that more than 77% of the plants used in traditional human medicine are ligneous species. The perennial character of these plants which provides each season some plants bodies for the human diseases treatment seems to be at the base of this

Table 3: Table of the therapeutic indications according to the plant bodies used in human pharmacopoeia

Bodies of plants used	No. of therapeutic indications	Bodies of plants used	No. of therapeutic indications
Seeds	06	Barks + Flowers	03
Fruits	13	Leaves + Roots	06
Leaves	08	Flowers	02
Barks	57	Bot Branch	07
Roots	56	Leaves stemmed	08
Gums	04		
Barks + Leaves	05	Total	175

solicitude. Similar results were observed by certain authors (Stauble, 1986; Rwangabo and de Robert Anton, 1993; Olivier and Sanou, 2003; Togola *et al.*, 2005; Belem *et al.*, 2006; Zerbo *et al.*, 2007; Gueye and Diouf, 2007).

All the parts of the plants are used: roots, barks, leaves, twigs, stems, flowers, fruits, gums, resins, latex or the whole plant. But the roots and the bark are more used (Table 3). This practice can cause the disappearance of the species and the loss of floristic diversity if debarking and uprooting were repetitive and most frequent. Such concerns were reported by Zerbo *et al.* (2007) and Ky *et al.* (2009).

In total 175 medical recipes were listed with traditional medicine practitioners. We note that the number of therapeutic indications is not proportionally correlated to the frequency of use which is directly in relation to the frequency of the diseases and the availability of the product. The main botanic plant families used are the Mimosaceae, the Caesalpinaceae, the Combretaceae, the Anacardiaceae and the Rubiaceae (Fig. 4). According to our results 93% of the medical recipes are provided by the ligneous phylogenetic species and 7% by the herbaceous ones. That testifies to the strong use of the woody phylogenetic species in the health care.

These therapeutic indications are used for the treatment of more than 50 diseases which main ones are gastrointestinal diseases (colics, dysentery, gastric ulcer and diarrhoea). More than thirty medical recipes are used to treat these pathologies of the digestive system. To treat malaria, 17 medical recipes are used. For the treatment of the skin diseases like wounds, oedema, itching, fractures, distortions and luxations, 15 traditional medicine recipes are used. The others traditional medicine recipes are used for the treatment of jaundice, the sterility, the birth control, the infantile diseases and the larynx and dental affections. Only one recipe has been listed for the treatment of leprosy and meningitis.

More than 22 recipes are made with the bodies of Mimosaceae, 14 recipes with the bodies of Combretaceae, of Anacardiaceae, of Rubiaceae, of Caesalpinaceae, of Bombacaceae and of Olacaceae. Several other recipes are a combination of several species and with various parts of these species.

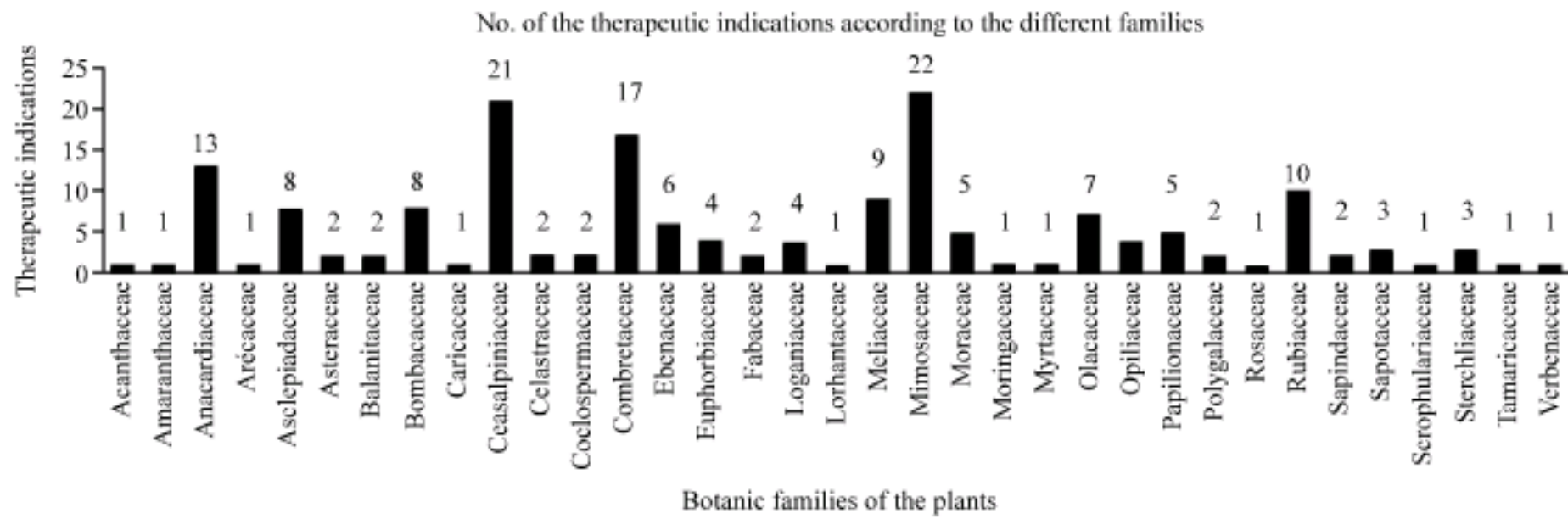


Fig. 4: Distribution of the botanic families according to their use

The principal forms of administration are the decoction, the mashing, the infusion, the juice, the powder, the crude extracts or calcined, sometimes added to the shea butter, or to the honey. The modes of administration, most usually used are the oral way, the inhalations, the baths (seat, face, head and whole body), the gargarism, the local applications, the massages and the enema.

These forms and modes of administration were also observed in other regions of Burkina Faso by the following authors (Togola *et al.*, 2005; Zerbo *et al.*, 2007). Therefore, there is a difference in the drug administration and the different species combination. The plants frequently requested for the traditional medicine recipes, are not exactly the same as those used in the West by Olivier *et al.* (2003) nor in the North-West by Zerbo *et al.* (2007). Moreover the therapeutic indications are different from a region to another.

Farming is highly developed in the Central Region East (Burkina Faso, Ministry of Economy and Development, National Institute of the Statistics and Demography, 2007). However, the high cost of modern veterinary and distance from supply centers make them inaccessible. The results of our investigations show that thirty three therapeutic indications of traditional medicine contribute to the treatment of livestock against the major diseases that are trypanosomiasis, tuberculosis, sores and skin diseases, diarrhea and difficult deliveries. This is confirmed by Tamboura *et al.* (2000) and Tapsoba and Deschamps (2006) in Burkina Faso. The modes of preparation and administration are not very diversified; there are two main forms which are decoctions and infusions and two modes of administration: oral and local applications. The species most used by traditional veterinary medicine belong to the botanic families of Mimosaceae, Meliaceae, Caesalpiniaceae, Sapotaceae and Sterculiaceae (Table 4). The species of these botanic families are under more exploitation in the

Table 4: Therapeutic indications of veterinary pharmacopoeia according to the botanic families

Botanic families	Therapeutic indications used
Anacardiaceae	01
Asclepiadaceae	01
Caesalpiniaceae	05
Combretaceae	02
Meliaceae	06
Mimosaceae	09
Papilionaceae	02
Rubiaceae	02
Sapotaceae	04
Sterculiaceae	01
Total	33

studied zone. These results show a significant contribution of traditional medicine in livestock development in the area.

CONCLUSION

Medicinal plants are widely used in human and veterinary medicine in the Center-East of Burkina Faso. They contribute to improve population health at low cost. Our results showed this strong use of the woody and herbaceous species. In human traditional medicine, 175 therapeutic indications were listed and 33 for veterinary medicine. These results show clearly the contribution of the traditional pharmacopoeia to human and animal healthcare. They also contribute to the achievement of objectives of the Strategic Framework of Traditional Medicine and Pharmacopoeia of Burkina Faso which aims to strengthen scientific research in the field of Traditional Medicine and Pharmacopoeia, to improve the system of production and distribution of medicines derived from Traditional Pharmacopoeia, to contribute to the protection of natural areas and to promote the cultivation of medicinal plants.

The results have also improved the level of knowledge of the use of the pharmacopoeia and traditional medicine in this area.

Therefore, the strong use of the woody species has necessarily negative impacts on the vegetation. Indeed the abusive exploitation of the barks, roots or stems contribute to the destruction of vegetation.

Moreover, with the strong use of the pharmacopoeia by the large majority of the population, the démographic growth rate and the migratory movements,

it appears obvious that the vegetation in this area could suffer damage. It is therefore important to have scientific knowledge on the evolution of this vegetation across a floristic inventory in order to determine its production capacity and to better organize and control its exploitation and its sustainable management.

APPENDIXES

Appendix 1: Plants used in the human pharmacopoeia and therapeutic indications in the treatment of some diseases. B F = Biological Form; T = Tree; Sh = Shrub; H = Herbaceous; Li = Lianas; Li Sh = Lianous Shrub; Sh P = Shrubs Parasitic

N°	Scientific names	Families	BF	Bodies used	Diseases	Modes of preparation and administration (Therapeutic indications)
1	<i>Acacia albida</i> Del.	Mimosaceae	T	Bark	Cough	Drink Decoction
2	<i>Acacia albida</i> Del.	Mimosaceae	T	Bark	Rum	Drink and inhalation Decoction
3	<i>Acacia albida</i> Del.	Mimosaceae	T	Bark	Articular pains	Drink Filtrated and concentrated of maceration
4	<i>Acacia albida</i> Del.	Mimosaceae	T	Bark	jaundice	Bath with Decoction in association with roots of <i>Cochlospermum planchonii</i>
5	<i>Acacia albida</i> Del.	Mimosaceae	T	Leaves	Cephalgias	Bath with Decoction
6	<i>Acacia albida</i> Del.	Mimosaceae	T	Laves	Stomachaches	Rectal injection with Decoction
7	<i>Acacia gourmaensis</i> A. Chev.	Mimosaceae	T	Bark	Itchings	Decoction in bath, drink and enema
8	<i>Acacia gourmaensis</i> A. Chev.	Mimosaceae	T	Bark + flowers	Stomachaches	Decoction in Drink in association with roots of <i>Ximenia americana</i>
9	<i>Acacia gourmaensis</i> A. Chev.	Mimosaceae	T	Bark	Malaria	Decoction in bath and enema in association with bark of <i>Bombax costatum</i> , <i>Pterocarpus erinaceus</i> and leaves of <i>Vitellaria paradoxa</i>
10	<i>Acacia gourmaensis</i> A. Chev.	Mimosaceae	T	Gum	Heart disease	Eating gum
11	<i>Acacia gourmaensis</i> A. Chev.	Mimosaceae	T	Roots	Stomachaches	Drink Decoction in association with roots of <i>Ximenia americana</i>
12	<i>Acacia macrostachya</i> Reichenb. ex DC.	Mimosaceae	T	Fruits	Intestinal worms	Absorption of the boiled fruits
13	<i>Acacia nilotica</i> (L.) Willd. ex Delile.	Mimosaceae	T	Fruits	Hémorroïdes	in bath seat + enema
14	<i>Acacia nilotica</i> (L.) Willd. ex Delile..	Mimosaceae	T	Fruits	Oral affections	Decoction in gargarism
15	<i>Acacia nilotica</i> (L.) Willd. ex Delile.	Mimosaceae	T	Dry fruits	Intestinal worms	Decoction in enema and bath seat
16	<i>Acacia seyal</i> Del.	Mimosaceae	T	Bark	Stomachaches	Drink infusion
17	<i>Acacia seyal</i> Del.	Mimosaceae	T	Gum	Heart disease	Absorption powders
18	<i>Acanthospermum hispidum</i>	Amaranthaceae	H	Leaves	Hémorroïdes	Drink Decoction and enema
19	<i>Adansonia digitata</i> L.	Bombacaceae	T	Leaves	Stomachaches	Drink Decoction
20	<i>Adansonia digitata</i> L.	Bombacaceae	T	Bark	Stomachaches	Drink Decoction
21	<i>Adansonia digitata</i> L.	Bombacaceae	T	Bark	Dermatoses	Decoction in bath in association with bark of <i>Acacia gourmanesis</i> , <i>Détarium microcarpum</i> and <i>Lannea acida</i>
22	<i>Adansonia digitata</i> L.	Bombacaceae	T	Roots	Leprosy	Drink Decoction
23	<i>Adansonia digitata</i> L.	Bombacaceae	T	Fruits	Jaundice	drink maceration
24	<i>Adansonia digitata</i> L.	Bombacaceae	T	Bark	Cough	Drink Decoction in association with bark of <i>Bombax costatum</i> and <i>Parkia biglobosa</i>
25	<i>Azelia africana</i> Smith. Ex Pers.	Cesalpiniaceae	T	Bark	Stomachaches	Rectal injection of Decoction
26	<i>Azelia africana</i> Smith. Ex Pers.	Cesalpiniaceae	T	Bark	Itchings	Drink Decoction and bath in association with bark of <i>Khaya senegalensis</i> and <i>Vittelaria paradoxa</i>
27	<i>Anogeissus leiocarpus</i> (Cd.) Guill. and Perr.	Combretaceae	T	Bark	Stomachaches	Drink Decoction
28	<i>Anogeissus leiocarpus</i> (Cd.) Guill. and Perr.	Combretaceae	T	Leaves	Stomachaches	Drink Decoction
29	<i>Anogeissus leiocarpus</i> (Cd.) Guill. and Perr.	Combretaceae	T	Bark	Constipation	Drink Decoction
30	<i>Anogeissus leiocarpus</i> (Cd.) Guill. and Perr.	Combretaceae	T	Roots	Jaundice	Filtrate of maceration in rectal injection
31	<i>Anogeissus leiocarpus</i> (Cd.) Guill. and Perr.	Combretaceae	T	Leaves	Diarrhoea	Drink Decoction
32	<i>Azadirachta indica</i> A. Juice.	Meliaceae	T	Leaves	Malaria	Decoction in bath and drink
33	<i>Balanites aegyptiaca</i> (L.) Del.	Balanitaceae	T	Fruits and gum	Heart disease	Drink Decoction
34	<i>Balanites aegyptiaca</i> (L.) Del.	Balanitaceae	T	Bark	Oedemas	Powder mixture in local application
35	<i>Bauhinia rufescens</i> Lam.	Cesalpiniaceae	T	Leaves	Stomachaches	Drink Decoction
36	<i>Borassus aethiopum</i> Mart.	Arécaceae	T	Stems	oedemas	Mixture of calcined stems + shea butter in local application and massage
37	<i>Burkea Africana</i> Hook F.		T	Bark	Oedemas	Decoction in local application

Appendix 1: Continued

N°	Scientific names	Families	BF	Bodies used	Diseases	Modes of preparation and administration (Therapeutic indications)
38	<i>Calotropis procera</i> (Ait) Ait F.	Asclepiadaceae	T	Leaves	Headaches	Powders in nasal inhalation
39	<i>Calotropis procera</i> Ait) Ait F.	Asclepiadaceae	Sh	Branches	Rum	Powders in nasal inhalation
40	<i>Calotropis procera</i> Ait) Ait F.	Asclepiadaceae	Sh	Flowers	Cough	Decoction in inhalation
41	<i>Calotropis procera</i> Ait) Ait F.	Asclepiadaceae	Sh	Roots	Anorexia	Drink Decoction in association with leaves of <i>Acacia seyal</i> , roots and branches of <i>Gardenia ternifolia</i>
42	<i>Calotropis procera</i> Ait) Ait F.	Asclepiadaceae	Sh	Roots + Barks	Female sterility	Decoction in rectal injection in association with roots of <i>Pterocarpus erinaceus</i>
43	<i>Caralluma dalzielii</i>	Asclepiadaceae	H	Leaves	Otitis	Decoction in local application
44	<i>Caralluma dequesnenea</i>	Asclepiadaceae	H	Leaves	Otitis	Decoction in local application
45	<i>Carica papaya</i> L.	Caricaceae	T	Leaves	Malaria	Drink Decoction
46	<i>Combretum micranthum</i> G. Don.	Combretaceae	Sh	Leaves	Infantile diarrhoea	Drink Decoction
47	<i>Combretum micranthum</i> G. Don	Combretaceae	Sh	Leaves	Malaria	Drink Decoction
48	<i>Ceiba pentendra will</i> (L.) Gaertn.	Bombaceae	T	Leaves	Stomachaches	Absorption juice drink Decoction or infusion of roots
49	<i>Ceiba pentendra</i> (L.) Gaertn.	Bombaceae	T	Roots	Jaundice	Drink Decoction and bath of face
50	<i>Cochlospermum tinctorium</i> Perr. Ex A. Rich.	Cochlospermaceae	Hv	Roots	Malaria	Drink Decoction and bath
51	<i>Cochlospermum tinctorium</i> Perr. Ex A. Rich.	Cochlospermaceae	Hv	Roots	jaundice	Drink Decoction and bath
52	<i>Chrysanthellum americanum</i>	Asteraceae	H	Broken into leaf stems	Hémorroïdes	Drink Decoction
53	<i>Chrysanthellum americanum</i>	Asteraceae	H	Broken into leaf stems	Renal calculi	Drink Decoction
54	<i>Crotalaria retusa</i> L.	Fabaceae	Sh	Branches and	First tooth	Bath and rectal injection of Decoction of whole plant branches and plants in association with <i>Acacia gourmaensis</i> .
55	<i>Danielia oliveri</i> (Rolfe) Hutch. and Dalz.	Cesalpiniaceae	T	Bark	Oral affections	Decoction in gargarism
56	<i>Danielia oliveri</i> (Rolfe) Hutch. and Dalz.	Cesalpiniaceae	T	Roots	Oral affections	Decoction in gargarism
57	<i>Danielia oliveri</i> (Rolfe) Hutch. and Dalz.	Cesalpiniaceae	T	Bark	Sore throat	Drink Decoction and gargarism
58	<i>Danielia oliveri</i> (Rolfe) Hutch. and Dalz.	Cesalpiniaceae	T	Leaves	Sore throat	Drink Decoction and gargarism
59	<i>Danielia oliveri</i> (Rolfe) Hutch. and Dalz.	Cesalpiniaceae	T	Roots	Sore throat	Drink Decoction and gargarism
60	<i>Detarium microcarpum</i> Guill. and Perr.	Cesalpiniaceae	T	Bark	Anorexia	Drink Decoction
61	<i>Detarium microcarpum</i> Guill. and Perr. and pain	Cesalpiniaceae	T	Bark	Renal disease	Drink Decoction
62	<i>Detarium microcarpum</i> Guill. and Perr.	Cesalpiniaceae	T	Leaves	Itching	Drink Decoction
63	<i>Detarium microcarpum</i> Guill. and Perr.	Cesalpiniaceae	T	Roots	Female sterility	Decoction in rectal injection
64	<i>Detarium microcarpum</i> Guill. and Perr.	Cesalpiniaceae	T	Fruits	Meningitis	Absorption of pulp
65	<i>Diospyros mespiliformis</i> Hochst. ex A. Rich.	Ebenaceae	T	Leaves	Diarrhoea	Drink Decoction in association with leaves of <i>Terminalia avicennioïdes</i>
66	<i>Diospyros mespiliformis</i> Hochst. ex A. Rich.	Ebenaceae	T	Fruits	Cholera	Juice filtrate + water in enema
67	<i>Diospyros mespiliformis</i> Hochst. ex A. Rich.	Ebenaceae	T	Roots	Difficulties in	Drink Decoction childbirth
68	<i>Diospyros mespiliformis</i> Hochst. ex A. Rich.	Ebenaceae	T	Roots	Nausea and	Drink macerated roots in association with roots vomiting of <i>Acacia machrostachya</i>
69	<i>Entada africana</i> Guill. and Perr.	Mimosaceae	T	Bark	Cough	Drink Decoction
70	<i>Eucalyptus camaldulensis</i> Dehnhardt	Myrtaceae	T	Leaves	Malaria	Drink and rectal injection Decoction
71	<i>Euphorbia convolvuloides</i>	Euphorbiaceae	H	Broken into leaf stems	Dysentery	Drink Decoction
72	<i>Euphorbia hirta</i>	Euphorbiaceae	H	Broken into leaf stems	Dysentery	Drink Decoction
73	<i>Euphorbia polycnimoïdes</i>	Euphorbiaceae	H	Broken into leaf stems	Dysentery	Drink Decoction
74	<i>Jatropha curcas</i>	Euphorbiaceae	Sh	Seeds	Constipation	Oral absorption
75	<i>Feretia apodanthera</i> Del.	Rubiaceae	Sh	Leaves	Constipation	Drink and rectal injection Decoction in association with leaves of <i>Maytenus senegalensis</i>
76	<i>Feretia apodanthera</i> Del.	Rubiaceae	Sh	Flowers	Articular pains	Local application of flowers Macerated
77	<i>Feretia apodanthera</i> Del.	Rubiaceae	Sh	Roots	Oral affections	Gargrism of Powder infusion
78	<i>Feretia apodanthera</i> Del.	Rubiaceae	Sh	Roots	Stomachaches	Drink Decoction in association with <i>Calotropis procera</i>
79	<i>Ficus glumosa</i> Del.	Moraceae	T	Bark	Malaria	Decoction in inhalation
80	<i>Ficus glumosa</i> Del.	Moraceae	T	Leaves	Malaria	Decoction in inhalation in association with leaves of <i>Tamarindus indica</i> and <i>Securinega virosa</i>
81	<i>Ficus gnaphalocarpa</i> (Miq) C. C. Berg	Moraceae	T	Bark	colics	Filtrated juice in absorption
82	<i>Ficus platiphylla</i> Del.	Moraceae	T	Roots	Renal diseases	Infusion Fitrat in bath and pains

Appendix 1: Continued

N°	Scientific names	Families	BF	Bodies used	Diseases	Modes of preparation and administration (Therapeutic indications)
83	<i>Gardenia erubescens</i> Stapf and Hutch.	Rubiaceae	Sh	Roots	Hiccups	Drink Decoction
84	<i>Guiera senegalensis</i> J. F. Gmel.	Combretaceae	Sh	Leaves	Diarrhoea	Decoction in bath and rectal injection
85	<i>Guiera senegalensis</i> J. F. Gmel.	Combretaceae	Sh	Leaves	Malaria	Drink Maceration of leaves
86	<i>Guiera senegalensis</i> J. F. Gmel.	Combretaceae	Sh	Leaves	Nauseas	Drink Maceration of leaves
87	<i>Hygrophillia barbata</i>	Acanthaceae	H	Seeds	Sore eyes	introduction into the eyes
88	<i>Khaya senegalensis</i> (Dest.) A. Juss.	Meliaceae	T	Bark	Stomachaches	Drink Decoction
89	<i>Khaya senegalensis</i> (Dest.) A. Juss.	Meliaceae	T	Bark	Itchings	Drink Decoction
90	<i>Khaya senegalensis</i> (Dest.) A. Juss.	Meliaceae	T	Bark	Oral affections	Decoction in gargarism or local application of the powder
91	<i>Khaya senegalensis</i> (Dest.) A. Juss.	Meliaceae	T	Bark	Wounds	Decoction in disinfection
92	<i>Khaya senegalensis</i> (Dest.) A. Juss.	Meliaceae	T	Roots	Wounds	Decoction in disinfection
93	<i>Lannea acida</i> A. Rich.	Anacardiaceae	T	Roots	Infantile diarrhoea	Drink Decoction and rectal injection
94	<i>Lannea microcarpa</i> Engl. and K. Krause	Anacardiaceae	T	Roots	Diarhée	Drink Decoction and rectal injection
95	<i>Lannea microcarpa</i> Engl. and K. Krause	Anacardiaceae	T	Roots	Stomachaches	Drink Decoction
96	<i>Lannea velutina</i> A. Rich.	Anacardiaceae	Sh	Bark	Cough	Drink Decoction
97	<i>Lannea velutina</i> A. Rich.	Anacardiaceae	Sh	Bark	Wounds	Decoction in local application
98	<i>Lannea velutina</i> A. Rich.	Anacardiaceae	Sh	Roots	Stomachaches	Drink infusion Decoction or filtrate
99	<i>Lannea velutina</i> A. Rich.	Anacardiaceae	Sh	Roots	General tiredness	Drink Decoction
100	<i>Leptadenia hastata</i> (Pers.) Decne	Asclepiadaceae	Li	Leaves	Fractures	Mixture with butter of <i>Vitellaria paradoxa</i> in massage
101	<i>Lippia chevalieri</i> Moldenke	Verbenaceae	H	Leaves	Jaundice and general tiredness	Drink Decoction
102	<i>Maytenus senegalensis</i> (Lam.) Exell	Celastraceae	Sh	Leaves	Fever	Decoction in inhalation and rectal injection
103	<i>Maytenus senegalensis</i> (Lam.) Exell	Celastraceae	Sh	Leaves	Articular pains	Decoction in bath and rectal injection
104	<i>Mitragyna inermis</i> (Willd.) Kuntze	Rubiaceae	T	Bark	Stomachaches	Decoction in drink and bath in association with bark of <i>Khaya senegalensis</i> , <i>Ficus gnaphamlocarpa</i> and <i>Ceiba pentandra</i>
105	<i>Mitragyna inermis</i> (Willd.) Kuntze	Rubiaceae	T	Bark	General tiredness	Drink Decoction and bath in association with bark of <i>Khaya senegalensis</i> , <i>Ficus gnaphamlocarpa</i> and <i>Ceiba pentandra</i>
106	<i>Moringa oleifera</i> Lam.	Moraceae	T	Seeds	Diabetes	Oral absorption
107	<i>Moringa oleifera</i> Lam.	Moringaceae	T	Leaves	hypotension	Oral absorption cooked or freshed
108	<i>Opilia celtidifolia</i> (G. and Perr.) Endl. ex Walp	Opiliaceae	Li Sh	Leaves	Stomachaches	Drink Decoction
109	<i>Opilia celtidifolia</i> (G. and Perr.) Endl. ex Walp	Opiliaceae	Li Sh	Leaves	Jaundice	Drink Decoction and bath
110	<i>Opilia celtidifolia</i> (G. and Perr.) Endl. ex Walp	Opiliaceae	Li Sh	Roots	Dysentery	Decoction in rectal injection
111	<i>Opilia celtidifolia</i> (G. and Perr.) Endl. ex Walp	Opiliaceae	Li Sh	Root	Female sterility	Drink Decoction
112	<i>Parinari curatellifolia</i> Planch. ex Benth.	Rosaceae	Sh	Root	Infantile weakness	Drink Decoction and bath
113	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	T	Bark	Hémorroïdes	Decoction in bath seat and rectal injection
114	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	T	Bark	Oral affections	Decoction in gargarism
115	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	T	Bark	wounds	Decoction in local application
116	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	T	Bark	Infantile cough	Drink Decoction and bath
117	<i>Paulinia pinnata</i> L.	Sapindaceae	Li	Bark	Faintnesses	Drink Decoction
118	<i>Paulinia pinnata</i> L.	Sapindaceae	Li	Branches	Infantile weakness	Drink Decoction and bath
119	<i>Pseudocedrela kotschy</i> (Schweinf.) Harms	Meliaceae	T	Gum	Tooth aches	Decoction in gargarism
120	<i>Pseudocedrela kotschy</i> (Schweinf.) Harms	Meliaceae	T	Root	Stomachaches	Drink Decoction and bath
121	<i>Pseudocedrela kotschy</i> (Schweinf.) Harms	Meliaceae	T	Root	Faintnesses	Drink Decoction in association with roots of <i>Ficus gnaphalocarpa</i>
122	<i>Pteleopsis suberosa</i> Engl. Diels	Combretaceae	T	Bark	Diarrhoea	Drink Decoction
123	<i>Pteleopsis suberosa</i> Engl. Diels	Combretaceae	T	Bark	Hémorroïdes	Decoction in bath seat and rectal injection
124	<i>Pteleopsis suberosa</i> Engl. Diels	Combretaceae	T	Bark	Headaches	Decoction + shea butter in local application
125	<i>Pteleopsis suberosa</i> Engl. Diels	Combretaceae	T	Roots	Stomachaches	Decoction in enema (baby)
126	<i>Pteleopsis suberosa</i> Engl. Diels	Combretaceae	T	Leaves	Stomachaches	Decoction in enema (baby)
127	<i>Pterocarpus erinaceus</i> Poir.	Papilionaceae	T	Leaves	Malaria	Drink Decoction in association with the branches of <i>Tamarindus indica</i>
128	<i>Pterocarpus erinaceus</i> Poir.	Papilionaceae	T	Leaves	Jaundice	Decoction in bath and rectal injection
129	<i>Pterocarpus erinaceus</i> Poir.	Papilionaceae	T	Root	Headaches	Drink Decoction
130	<i>Pterocarpus erinaceus</i> Poir.	Papilionaceae	T	Root	Stomachaches	Decoction in enema
131	<i>Pterocarpus erinaceus</i> Poir.	Papilionaceae	T	Root	Infantile diarrhoea	Decoction in enema

Appendix 1: Continued

N°	Scientific names	Families	BF	Bodies used	Diseases	Modes of preparation and administration (Therapeutic indications)
132	<i>Sarcocephalus latifolius</i> (Smith) Bruce	Rubiaceae	Li Sh	Leaves	Malaria	Decoction in bath in association with leaves of <i>Pseudocdrele kotschy</i>
133	<i>Sarcocephalus latifolius</i> (Smith) Bruce	Rubiaceae	T Li Sh	Leaves	Renal disease and pains	Drink Decoction and rectal injection in association with leaves of <i>Hipomea asarifolia</i>
134	<i>Sarcocephalus latifolius</i> (Smith) Bruce	Rubiaceae	T Li Sh	Fruits	Sore eyes	Decoction in bath of face
135	<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	T	Roots	General tiredness	Decoction in bath
136	<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	T	Bark	Wounds	Decoction in local application
137	<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	T	Bark	Diabetes	Drink Decoction
138	<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	T	Sheets	Diabetes	Drink Decoction
139	<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	T	Sheets	Malaria	Drink Decoction
140	<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	T	Bark	Malaria	Drink Decoction
141	<i>Scorpija dulcis</i>	Scrophulariaceae	H	Leaves	Angina	Drink Decoction
142	<i>Securidaca longepedunculata</i> Fres.	Polygalaceae	T	Roots	Bite of snake	Drink Decoction in association with milk or in association with <i>Prosopis africana</i> and <i>Annona senegalensis</i>
143	<i>Securidaca longepedunculata</i> Fres.	Polygalaceae	T	Roots	Hernia	Drink Decoction and absorption powders dried in mixture with seeds of <i>Senna sieberiana</i>
144	<i>Senna alata</i>	Cesalpiniaceae	Sh	Leaves	Stomachaches	Drink Decoction
145	<i>senna occidentalis</i> L.	Fabaceae	H	Leaves	Malaria	Drink Decoction
146	<i>Senna sieberiana</i> DC.	Cesalpiniaceae	T	Bark + Leaves	jaundice	Drink Decoction
147	<i>Senna sieberiana</i> DC.	Cesalpiniaceae	T	Root	Chronic cephalgias	Powders in nasal absorption in association with roots of <i>Khaya senegalensis</i>
148	<i>Sterculia setigera</i> Del.	Sterculiaceae	T	Bark	Dermatoses	Decoction in bath in association with <i>Acacia gourmaensis</i> and <i>Detarium microcarpum</i>
149	<i>Sterculia setigera</i> Del.	Sterculiaceae	T	Leaves	Fever	Decoction in bath
150	<i>Strychnos spinosa</i> Lam.	Loganiaceae	Sh	Leaves + Roots	Stiffening of the children	Decoction in bath
151	<i>Strychnos spinosa</i> Lam.	Loganiaceae	Sh	Roots + leaves	Sexual impotence	Drink of Macerated roots and leaves
152	<i>Strychnos spinosa</i> Lam.	Loganiaceae	Sh	Roots + leaves	Sexual impotence	Powders in absorption with soup
153	<i>Strychnos spinosa</i> Lam.	Loganiaceae	Sh	Bark	Stomachaches	Drink infusion filtrate in association with bark of <i>Khaya senegalensis</i>
154	<i>Tamarindus indica</i> L.	Cesalpiniaceae	T	leaves	Malaria	Drink Decoction
155	<i>Tamarindus indica</i> L.	Cesalpiniaceae	T	Fruits	Anorxie	Drink Macerated fruits
156	<i>Tamarindus indica</i> L.	Cesalpiniaceae	T	Fruits	Constipation	Drink Macerated fruits
157	<i>Tamarindus indica</i> L.	Cesalpiniaceae	T	Roots	Giddinesses	Decoction in bath in association with roots of <i>Sarcocephalus latifolius</i> and <i>Acacia nilotica</i>
158	<i>Tamarindus indica</i> L.	Cesalpiniaceae	T	Roots	Infantile weakness	Decoction in bath
159	<i>Tamarix senegalensis</i> DC.	Tamaricaceae	Sh	Roots	Stomachaches	Macerated out of drink in association with <i>Khaya senegalensis</i> and <i>Solanum</i> sp.
160	<i>Tapinanthus dodoneifolius</i> DC.	Lorhantaceae	Sh P	leaves	Cephalgias	Decoction in bath
161	<i>Terminalia avicennioïdes</i> Guill. and Perr.	Combretaceae	T	Root	Stomachaches	Decoction in rectal injection
162	<i>Terminalia avicennioïdes</i> Guill. and Perr.	Combretaceae	T	Bark	Stomachaches	Decoction in enema
163	<i>Vitellaria paradoxa</i> Gaertn. F.	Sapotaceae	T	Bark	Infantile Stomachaches	Decoction in enema
164	<i>Vitellaria paradoxa</i> Gaertn. F.	Sapotaceae	T	Bark	Stomachaches	Drink Decoction
165	<i>Vitellaria paradoxa</i> Gaertn. F.	Sapotaceae	T	Bark	Dermatoses	Drink Decoction
166	<i>Vitex doniana</i> Sweet	Ebenaceae	T	Root roots	Dysentery	Drink Decoction
167	<i>Vitex doniana</i> Sweet	Ebenaceae	T	Root roots	Dysentery	Drink Decoction
168	<i>Waltheria indica</i> L.	Sterculiaceae	H	Roots	Cough	Drink Decoction
169	<i>Ximenia americana</i> L.	Olacaceae	Sh	Roots	infantile Stomachaches	Drink infusion filtrated
170	<i>Ximenia americana</i> L.	Olacaceae	Sh	Roots	Stomachaches	Drink and rectal injection of Decoction
171	<i>Ximenia americana</i> L.	Olacaceae	Sh	Root	Tooth aches	Decoction in gargarism
172	<i>Ximenia americana</i> L.	Olacaceae	Sh	Root	Infantile diarrhoea	Powders in absorption
173	<i>Ximenia americana</i> L.	Olacaceae	Sh	Roots	Cutaneous wounds and eruptions	Decoction in bath
174	<i>Ximenia americana</i> L.	Olacaceae	Sh	Leaves	Constipation	Drink Decoction and rectal injection in association with leaves of <i>Maytenus senegalensis</i>
175	<i>Ximenia americana</i> L.	Olacaceae	Sh	Leaves	Fever	Decoction in inhalation

Appendix 2: Principal plants used in the pharmacopeia veterinary

N°	Scientific names species	Botanic families	Vernacular name			Cured disease	Modes of preparation and administration (Therapeutic indications)
			Morée	Bissa	Fulfuldé		
01	<i>Acacia seyal</i> Del.	Mimosaceae	Go-pelga-Poghnaga	Lâ-fu or Lorr-hu	Bidehi or Bulbi or Buthi or Komanahi	distension	Enema barks decoction
02	<i>Bauhinia rufescens</i> Lam.	Caesalpiniaceae	Ti-pwèega	Gamboga or Namadi or Namali	Namaaro or Namadi or Namali	Trypanosmiasis	Drink leathes + bark decoction + salt
03	<i>Combretum molle</i> R. Br.ex G. Don	Combretaceae				Trypanosmiasis	Drink bark decoction
04	<i>Daniella oliveri</i> (Rolfe) Hutch. and Dalz.	Caesalpiniaceae				Tuberculosis	Drink roots decoction
05	<i>Entada africana</i> Guill. and Perr.	Mimosaceae	Sinnogo or Soonogo	Lagansa or Lakansa	Ladowanduki or Faroanduki or Mbuda	Trypanosomosis	Local application of bark decoction
06	<i>Feretia aprodenthera</i> Del.	Rubiaceae				Trypanosomosis	Drink leathes maceration
07	<i>Khaya senegalensis</i> (Dest.) A. Juss	Meliaceae	Kuka	Mon	Kahi	Diarrhoea	Drink bark decoction
08	<i>Khaya senegalensis</i> (Dest.) A. Juss	Meliaceae	Kuka	Mon	Kahi	Wounds	Local application bark decoction
09	<i>Khaya senegalensis</i> (Dest.) A. Juss	Meliaceae	Kuka	Mon	Kahi	Trypanosomosis	Drink bark powders infusion + Sel
10	<i>Khaya senegalensis</i> (Dest.) A. Juss	Meliaceae	Kuka	Mon	Kahi	Trypanosomosis	Drink bark decoction
11	<i>Khaya senegalensis</i> (Dest.) A. Juss	Meliaceae	Kuka	Mon	Kahi	Trypanosomosis	Drink bark infusion
12	<i>Khaya senegalensis</i> (Dest.) A. Juss	Meliaceae	Kuka	Mon	Kahi	Trypanosomosis	Drink leaves decoction
13	<i>Leptadenia hastata</i> (Pers.) Decne	Asclepiadaceae	Lelongo			Distension	Drink leaves decoction
14	<i>Mitragyna inermis</i> (Willd.) Kuntze	Rubiaceae				Tuberculosis	Drink leaves decoction + shea butter
15	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	Roanga or Doaga			Wounds	Rectal injection with fruits decoction
16	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	Roanga or Doaga			Trypanosomosis	Drink bark decoction
17	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	Roanga or Doaga			Wounds	Local applications bark and roots decoction
18	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	Roanga or Doaga			Wounds	Local application bark decoction
19	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	Roanga or Doaga			Diarrhoea	Drink bark powders infusion
20	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	Roanga or Doaga			Nodular dermatosis	Bath infusion of the powder of bark alone or associated to <i>Khaya senegalensis</i>
21	<i>Parkia biglobosa</i> (Jacq.) R. Br. ex G. Don	Mimosaceae	Roanga or Doaga			Tuberculosis	Drink bark decoction
22	<i>Pterocarpus erinaceus</i> Poir.	Papilionaceae	Noèga or	Kyeon	Outlaw or Gaedi	Diarrhoea	Drink bark decoction Noèka Banuhi or
23	<i>Pterocarpus erinaceus</i> Poir.	Papilionaceae	Noèga or Noèka	Kyeon	Outlaw or	Trypanosomosis	Banuhi or Gaedi Drink bark decoction
24	<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	Noabga	Sugol or Sugola	EDI or Edehi or Dede	Wounds	Local application of bark decoction
25	<i>Sterculia setigera</i> Del.	Sterculiaceae	Punpunga or Kutrummuka or Posemporgo	Zontugo or Zugonto	Borboli or Bobori or Boholi	Wounds	Drink fruits infusion
26	<i>Tamarindus indica</i> L.	Caesalpiniaceae	Pusga	Hôr or Fori Kar	Diami or jabi or jami Nerehi	Difficulties of delivery	Drink leaves decoction
27	<i>Tamarindus indica</i> L.	Caesalpiniaceae	Pusga	Hôr or Fori Kar	Diami or jabi or jami Nerehi	Nodular Dermatitis	Drink fruits decoction
28	<i>Tamarindus indica</i> L.	Caesalpiniaceae	Pusga	Hôr or Fori Kar	Diami or jabi or jami Nerehi	Nodular dermatosis	Drink fruit juice
29	<i>Terminalia avicennioides</i> Guill. and Perr.	Combretaceae	Kodre	Kôte	Boodi or Pulomi	Tuberculosis	Drink bark decoction
30	<i>Vitellaria paradoxa</i> Gaertn. F.	Sapotaceae	Taanga	Kuru or Kru	Karedie or Karéhi	Diarrhoea	Drink bark decoction
31	<i>Vitellaria paradoxa</i> Gaertn. F.	Sapotaceae	Taanga	Kuru or Kru	Karedie or Karéhi	Wounds	Local application of bark decoction in association with bark of <i>Khaya senegalensis</i>
32	<i>Vitellaria paradoxa</i> Gaertn. F.	Sapotaceae	Taanga	Kuru or Kru	Karedie or Karéhi	Nodular dermatosis	Drink bark powders infusion + powder of barks of <i>Parkia biglobosa</i>
33	<i>Vitellaria paradoxa</i> Gaertn. F.	Sapotaceae	Taanga	Kuru or Kru	Karedie or Karéhi	Trypanosomosis	Drink decoction barks

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