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Ethno-medicinal study of plants used in ectoparasites infections of ruminant livestock in sahelian region of Burkina Faso, West Africa.

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ABSTRACT

*A survey of plants used in ectoparasite infections can provide important information for natural treatments in farming areas, in order to produce novel products. An ethnobotanical survey on plants used to treat ectoparasite infections of ruminant livestock was conducted in the village of Borguendé located in sahelian region of Burkina Faso using. The approach adopted integrates questionnaires and interviews. The results of the survey found a total of 17 traditional remedies containing 19 plants belonging to 13 different families that were used in the treatment of various pathological effects of ectoparasites. The plants frequently used were *Nicotiana tabacum* (15,9%), followed by *Adenium obesum* (12,7%) and *Bridelia micrantha* (11,1%). The current forms of use are the decoction (65%), the maceration (20%) and the powder (15%). The main administration forms of these remedies include the application on skin (70%) and the oral route (30%). Therefore, protection measures of these plants and also the assessment of their therapeutic efficiency will reinforce their efficient utilisations by the livestock breeders.*

Keywords: Ethnomedicinal; Ectoparasites; Traditional medicines, Sahelian region, Burkina Faso.

INTRODUCTION

In Burkina Faso, the traditional pharmacopoeia in veterinary is abundant, because of a diversity of the group ethnics, customs, and agro-ecological characteristics of regions [1]. The health management of people and domestic animals is based partially on the exploitation of natural resources, such as medicinal plants in different area of the country [2]. In order to take advantage of this medicine for animal productions, various scientific studies are achieved in traditional remedies assessment worldwide for its valorization [3].

Ectoparasite's infections constitute an important problem of animal and human health, but they are characterised by a weak consideration or are neglected. Medecinal plants can play an important role in the control of ruminant livestock's external infections. For the small farmers with low income, these infections can lead to enormous and insidious losses in the herds, by weakening the body of animals and by transmitting diseases often difficult to diagnose [4] [5].

This work aims therefore to contribute to enhance knowledge of the plants and the remedies used in the control of animal's diseases in traditional veterinary in Burkina Faso. The objectives of this study were (i) to better understand the practices of traditional veterinary of ruminant livestock in the sahelian region of the country and (ii) to identify the traditional remedies used by local farmers in the treatment of ectoparasites infections.

MATERIALS AND METHODS

1- Study area

The study area is situated in the sahelian area of Burkina Faso an arid area located between the latitudes 13°5' N and 15°3' N. The annual rainfall is inferior of 600 mm with the temperatures varying from 15°C to 47°C. The type of Vegetation is dominated by the grassy or shrubby steppe; the main woody species are *Balanites aegyptiaca*, *Acacia sp.* and *Adansonia digitata*, etc. [6].

The site of the survey is the village of Borguiendé. This village was randomly selected among a total of 183 villages, on the basis of socio-economic-cultural diversity and accessibility (figure 1). The population of the village is estimated at 2 230 inhabitants, with 1 114 men and 1 116 women coming from 439 households, which a main activity is animal breeding. According to the national statistics, the study area contains 270 837 cattle, 287 6411 sheep and 367 722 goat [7].

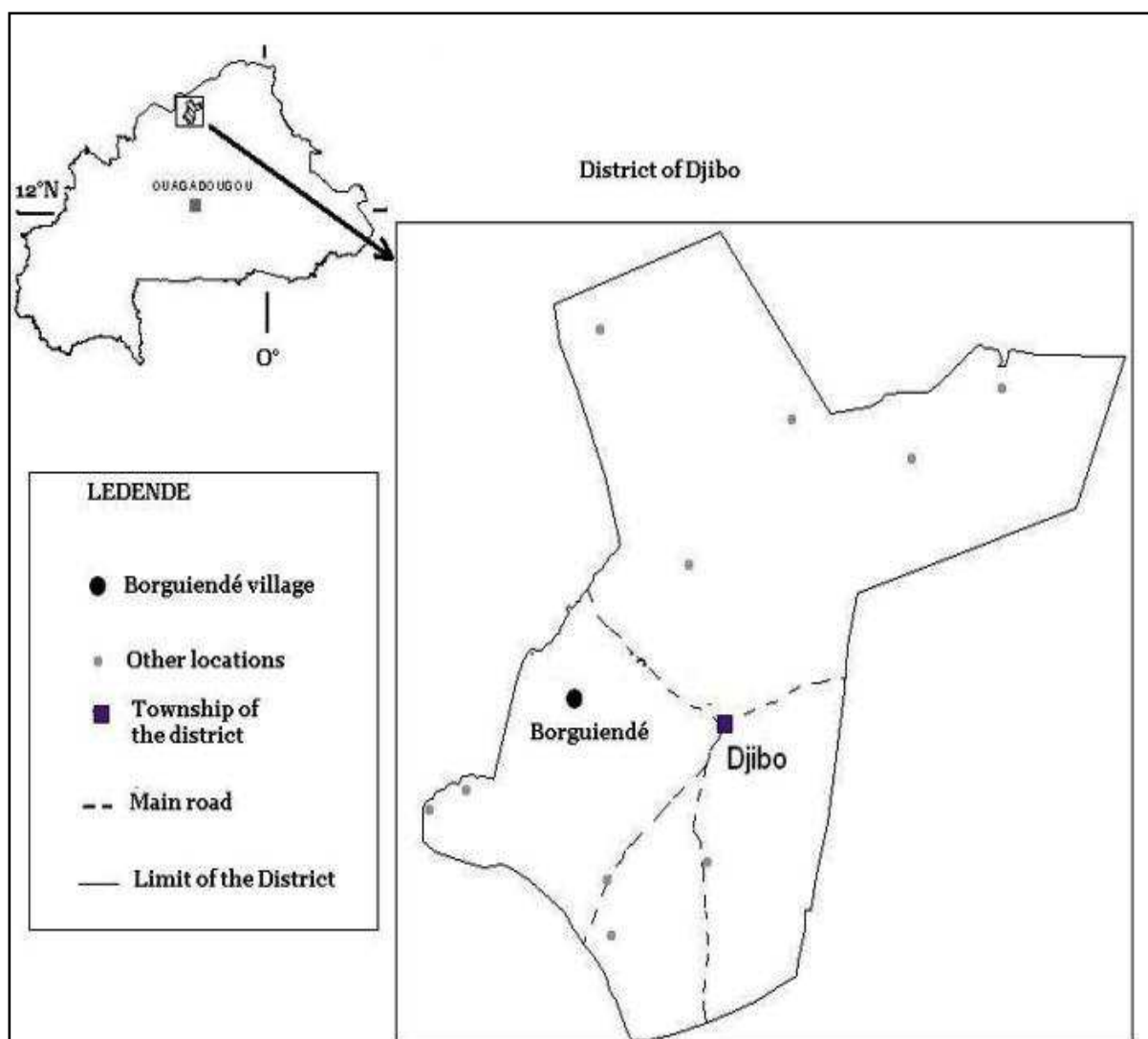


Figure 1: Location of the study site in Burkina Faso, West Africa.

2- Data collection and analysis

For the study, a participative approach was used from July 2011 to April 2012. The population of the village was sensitized several days before survey. A semi-structured interview was conducted individually, based on a formal

questionnaire. A total of 74 livestock breeders were sampled at random in the listing of the total population of the village. The information collected from each informant and relative to the animal includes the breeding characteristic, their understanding of external parasites of the ruminant, the symptoms of affected animals and the local methods of treatments. Information on the treatments of ectoparasites include the local name of medicinal plant, the parts used, the preparation methods and their actions were asked. In addition, plant samples were collected for later identification.

The interviews were followed by visit of animal ruminant herds.

All collected data were used for descriptive statistics such as mean, frequency and percentage using Statview for Windows, version 4.57.

RESULTS

1- Profil of the respondents

During the survey, seventy four (74) respondents interviewed, were constituted by men (91.1 %), and t by women (8.1 %) were. Most of them were agri-breeders, doing both agriculture and animal breeding (89.2 %), with only few pure breeders (10.8 %) (table 1). Their average age was 53 years varying between 29 and 74 years. This pool of informants was composed by five (5) ethnic groups including Fulani (47.3 %), Rimaïbé (16.2 %), Mossi (13.5 %), Fulsé (13.5 %) and Dogon (9.4 %). The majority of theme (63.5 %) was alphabetized in French (10.6%) and local languages (89.4%), such as Fulfudé (75%) and Koronfé (Fulsé) (15 %).

Table 1: socioeconomic Profile of the respondents

Characteristics	Number	Ration (%) (To the number of the respondents)
Gender	Men	68 91,8%
	Women	06 8,1%
Ethnic groups	Peul (<i>Fulani</i>)	35 47,3%
	Rimaïbé	12 16,1%
	Mossi	10 13,5%
	Koronfé (<i>fulsé</i>)	10 13,5%
	Dogon	7 9,4%
Education	illiterate	27 36,5%
	Alphabetized :	47 63,5%
	- local	42 89,4%
	- french	5 10,6%
Activities	Agro-breeders	66 89,2%
	Breeders	8 10,8%

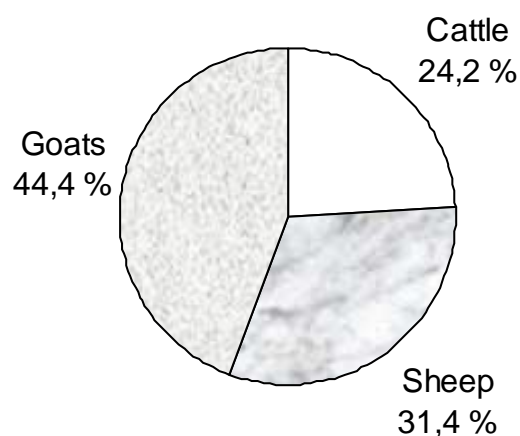


Figure 2: Ruminant herd composition in the village of Borguiendé

2- Ruminant livestock in the site study

On the site study, the number of small ruminants was higher (75.8 %) than the cattle (24.2 %) (figure 2). The small ruminant is composed by goats (44.4%) and sheep (31.4 %).

According to the respondents, the livestock breeding is characterised by two systems characterized by the sedentary system which is dominant (81.1 %) and the transhumant system (18.9 %). An important high proportion of informants (83.8 %) have cowshed built with wood cut from the bush (79 %) or made of earth (4 %), against 16,2% having no shed for their animals.

3- Reasons for the uses of traditional medicine for ectoparasites infections.

Among the informants in the village of Borguendé, 98.6% are combining both modern and traditional medicine, while only 1.4 % of them use solely the modern medicine to control ectoparasites. The main reasons evoked for this mix practice are the plants accessibility (85 %) and their easy preparation and administration (72 %). The parts of plant used are leaves (62 %), barks (31 %) and seeds (17 %). In addition to the plants, other elements are often associated such as potassium hydroxide, urines of cattle, limestone, ash, shea butter, water and salt.

In the modern medicine, the conventional products used against ectoparasites infections of ruminant livestock in the study area are constituted by Ivermectin as Alphamec ®, Vitamec ®, Iverin ® and Ivomec D ®.

4- Knowledge on ectoparasites

According to the respondents, the ectoparasites of animal ruminants are constituted by lice (*Tendi* in Fulfudé), ticks (*Kooti*), flies (*Bokkaje*), and mosquitoes (*sufi*). The main factors favoring their appearances are the transhumances (80 % of the respondents), following by the rain season (50 %). The diagnosis of the disease is based on the skin hurts, the papules and the crusts of the dermatitis (40 %), the presence of ticks with localized irritation, loss of hairs, wounds and loss of weight (60%).

5 - Traditional remedies against ectoparasites

During the survey, seventeen (17) traditional remedies were mentioned by the respondents in the control of ectoparasites and their diseases on the ruminant livestock. Table 2 presents an overview of these remedies, their various uses and the diseases treated according to the respondents. These remedies are composed essentially by nineteen (19) medicinal plants belonging to thirteen (13) identified botanical families. The most plants used are *Nicotiana tabacum* (15.9 %), *Adenium obesum* (12.7 %) and *Bridelia micrantha* (11.1 %); followed by *Azadirachta indica* (6.3 %). These remedies are used in the form of decoction (65 %), soak (20 %) or powder (15 %). The administration of these remedies is made by application on the skin (70 %) or by oral route (30 %). The duration of treatments varies from 2 to 7 days according to remedies which are free of charge (75 %) or at low cost (5 %)

Table 2: Overview of traditional veterinary remedies used to control ectoparasites and their effects on ruminant livestock in the village of Borguendé, Province of Soum in Burkina Faso, West Africa.

Plants			Parts used	Methods of preparation and uses	Actions
Species	Local names	Family			
<i>Adenium obesum</i>	Zénega	Apocynaceae	whole plant	- Mix in water to make a moss - Whitewash the animal in 2 to 3 applications	Burr, ticks and insects
<i>Khaya senegalensis</i>	Kuka	Meliaceae	Seeds and leaves	- Crush the whole, to add potash and of the butter of shea tree; - Apply on the skin of the animal.	Cutaneous lesions
			Leaves and bark		
<i>Azadirachta indica</i>	Niim	Meliaceae	Seeds	- Crush and mix to potash; - apply 1 or 2 times per day during one week.	Ticks, flies, lice and insects
<i>Nicotiana tabacum</i>	Tabac	Solaceae	leaves and potash	- Crush the leaves and mix to potash; - Apply 1 to 2 times on the skin of the animal.	Insects, ticks, flies and lice.
			leaves, ash of wood and urine of cow	- Crush the leaves and mix to the ash and the urine of cattle - An application on skin	Insects, ticks, flies and lice.

Table 2 (continued 1)

- <i>Allium cepa</i> - <i>Paullina pinnata</i> - <i>Parkia biglobosa</i>	- Zeyon gabdo, - Nus-a-nu - Roaoga	- Liliaceae - Sapindaceae - Mimosaceae	leaves	- Make a mixture, filter, make cooler - drink 2 to 3 times in one week	Ticks
<i>Bridelia micrantha</i>	Taasalgo	Euphorbiaceae	bark	- Decoction - drink 2 to 3 times in one week	Burr
<i>Aloe buettneri</i>	Napug-mandé	Liliaceae	Cool leaves	Use juice and apply on the hutted part	Cutaneous lesions
<i>Ricinus communis</i>	Gan-noanga	Euphorbiaceae	Seeds	- Grill the seeds before crushing to mix the dough with the butter of shea tree - apply 2 to 3 times within a week	Cutaneous lesions
<i>Phaseolus vulgaris</i>	Nasar-benga	Fabaceae	Seeds and leaves	- Decoction to drink - one administration at once	Internal wounds
<i>Mitragyna inermis</i>	Yiilga	Rubiaceae	Leaves, bark and salt	- Macerate the whole during 24 - Make drink	Internal wounds
<i>Bridelia ferruginea</i>	Ambriaka	Euphorbiaceae	bark	- Add potash and make a decoction - Make drink 2 times per day during one week	Internal wounds

Table 2 (continued 2)

<i>Cassia nigricans</i>	Zangrékuka	Caesalpiniaceae	leaves and cool stems	- Steeping during 1à 2 days; - Pulverize on the animal	Ticks, insects, lice and flies.
- <i>Carica papaya</i> - <i>Bauhinia rufescens</i>	- Papaye - Tipoiyiga	- Caricaceae - Caesalpiniaceae	- Green fruit - Bark	- crush the whole and macerate with water - Make drink	-
- <i>Combretum micranthum</i> - <i>Acacia gourmaensis</i>	- Randga - Gonsblega	- Combretaceae - Mimosaceae	Feuilles, potasse et cendre	- Crush the whole and add potash and the ash - 2 to 3 applications during one week	Cutaneous lesions
<i>Lannea acida</i>	Sabtulga	Anacardiaceae	Bark and seed	- Mix the powder of the seeds and the crushed bark in water - Make drink 2 times in one week	Cutaneous lesions

DISCUSSION

The population of the village of Borguendé has indigenous knowledge in animal health care for livestock breeding productions and they cope with the nature. Regrettably, this knowledge is kept by very hold person, and the young people seem to have little interest to it. In the long term, there is a high risk of losses of this local knowledge, which constitute an important cultural wealth for the region generally and for the Burkina Faso in particular. Therefore, measures of valorization of this knowledge must be taken, by the intensification of literacy in the local languages, with particular accent on the writing. A majority of the interviewees, were are alphabetized through various projects of development's interventions; the writing will boost the transmission between of indigenous knowledge on the uses of medicinal plants

In our survey, investigated persons were in majority of the agri-breeders (89.2%) in an area which as a breeding reputation. This reconversion of the economic activity of the autochthonous breeders can be explained by a coping strategy, as response to recurrent droughts these last decades leading to enormous losses of cattle's herds in the region. This strategy is based on a diversification of their activities in order to guarantee the food and economic security. Also, the negative effects generated by droughts, led to drive a particular attention to small ruminants breeding during these last years in the site area. The small ruminants have easy acquisition because of low cost, in comparison to cattle; this conversion concerns, particularly the majority of livestock breeders who experienced serious losses during the drought events.

In our study, the transhumance is the first cause of the presence of ectoparasites according to the informants. Indeed, every year the transhumance is practiced by most of the breeders in order to look for the water and more nourishing natural pastures for their herds. During their stay in the humid zones of transhumance, the animals are infected by ectoparasites, and they bring them back at the beginning of rainy season. This period in the area of study is favorable for ectoparasites, which find the appropriated hosts for their development [8].

This analysis of information reveals that the informants have a good perception of the propagation of ectoparasites and the negative consequences on animal productivity. Given that, during this period of rainy season, the breeders have many difficulties to maintain the hygiene of the cowsheds, due to bad weather which accentuate their unsanitary state.

After the rainy season, serious problems of food and water for animal are raised in the area, aggravating the economic losses led by the pathogenic effects of the ectoparasites (transmitted diseases) on the raised ruminants.

For the struggle against these ectoparasites of the ruminant livestock, the majority of investigated persons use the traditional veterinary therapy based on remedies of medicinal plants. The evoked reason is insidiously the high price of conventional products, confirming the observations of Fajimi and Taiwo [9] on the reasons driving the african breeders to practice the traditional medicine.

In our opinion, the knowledge of the inquired persons in the struggle against the ectoparasites deserve to be valorized because these knowledge have cultural importance, and also the natural products used present less secondary negative effects 'on environment than the conventional products. In this option, validation tests of these remedies are needed, in order to secure their uses by the breeders.

Following the example of our study, *Nicotiana tabacum* is one of the plants used to control ectoparasites in Cameroon where an insecticidal efficiency rate of 59.8 % was found by Nfi *et al.* [10]. In our survey found four plants eg. *Nicotiana tabacum*, *Adenium obesum*, *Bridelia micrantha*, *Azadirachta indica* mentioned as the main important used against the ectoparasites infections. According to Tovang *et al.* [11] (2007), these plants can be used to control ectoparasites of livestock.

The analysis of the route of administration of the products mentioned shows that the targets are different for the treated animal. Probably, the products managed by cutaneous route are aiming at killing or to inhibiting the present of external parasites on the skin, whereas those managed by oral route are aiming to at fighting against the germs of the diseases transmitted by the ectoparasites.

CONCLUSION

The present study achieved in sahelian zone of the Burkina Faso confirms that the veterinary pharmacopoeia is a current practice in the country to take care of animal diseases. This medicine contains important potentialities to be exploited, as a complement to the modern veterinary medicine for the control of ectoparasites of livestock breeding. In this sense, experimental researches of the validation of the efficiency of plants remedies proposed by the population need more investigations, in order to secure theirs uses by breeders. For that purpose, studies of toxicology, phytochemistry analysis and parasitology tests should be envisaged in order to valorize the local knowledge of the rural livestock breeders of country.

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