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Research Article

USE PRACTICES AND VULNERABILITY OF *COMBRETUM MICRANTHUM* G. DON AND *SARCOCEPHALUS LATIFOLIUS* (SM.) BRUCE EXPLOITED BY THE BWA COMMUNITY IN THE LIVESTOCK OF SMALL RUMINANTS IN BURKINA FASO

[1,2*]TIANHOUN Denté Fidèle, [2]MEDA Nãg-Tiéro Roland, [3]ZABRE Geneviève, [1]KABORE Adama, [1]TAMBOURA H. Hamidou, [4]BELEM Adrien Marie Gaston

[1]Centre National de la Recherche Scientifique et Technologique / Institut de l'Environnement et de Recherches Agricoles, 04 BP 8465 Ouagadougou 04, Burkina Faso.
[2] Laboratoire de Recherches et d'Enseignements en Santé et Biotechnologies Animales / Ecole Doctorale Sciences Naturelles et Agronomie / Université Nazi Boni, 01 BP 1091 Bobo-Dioulasso 01, Burkina Faso
[3] Laboratoire de Physiologie Animale / UFR-SVT / Université Joseph Ki-Zerbo,Ouagadougou, 03 BP 7021 Ouagadougou 03, Burkina Faso
[4] Institut du Développement Rural / Université Nazi Boni, 01 BP 1091 Bobo-Dioulasso 01, Burkina Faso.

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ABSTRACT

Populations in rural areas of Burkina Faso depend on woody plant resources to meet their daily needs. With regular anthropogenic pressure on these resources, it is necessary to assess the uses and vulnerability of the species *C. micranthum* and *S. latifolius* commonly exploited by the Bwaba populations in order to propose sustainable management solutions. To do this, semi-structured surveys were carried out with the community of Bwaba producers in the Boucle du Mouhoun region and associated with a dendrometric inventory. The results obtained show that the two plants are well used by the populations in traditional human and veterinary pharmacopoeia but also in livestock feed as fodder and in wood for energy and crafts. Apart from the use of the stem of *C. micranthum* used in energy wood, the leaves of the two plants constitute the most used organ. The dendrometric measurements have shown that the two plants are overexploited by the populations and must benefit from a particular attention of preservation actions. Sensitization of the populations of reasoned uses of these plant resources therefore remains necessary with a recommendation to use the leaves instead of the barks and roots when these parts can bring the same result, particularly in traditional pharmacopoeia.

Keywords: *C. micranthum*, *S. latifolius*, use, vulnerability, Burkina Faso.

INTRODUCTION

Burkina Faso is an agro pastoral Sahelian country, where agriculture and livestock breeding are the two main activities that occupy more than 80% of the population (MRA, 2011b).The livestock sub-sectoral one employs nearly 86% of the country's working population and accounts for around 10-20% of gross domestic product (MRAH, 2019).This livestock farming is dominated by the traditional system practiced by a large number of agro pastoralists and remains the main supplier of meat and milk to the national market (FAO, 2019).In this system, natural pastures are subject to free use. They are the main source of feed for the animals; accounting for around 75% of their diet (MRA, 2004).Today, one of the main constraints to the development of livestock farming in Burkina Faso is food insecurity and health problems. Indeed, grasses meet the food and nutritional needs of livestock during the rainy season (Ouédraogo, 2006). However, during the long dry season (5 to 7 months, depending on the climatic zone), feeding ruminants becomes a crucial problem, as

*Corresponding Author: TIANHOUN Denté Fidèle, Centre National de la Recherche Scientifique et Technologique / Institut de l'Environnement et de Recherches Agricoles, 04 BP 8465 Ouagadougou 04, Burkina Faso Email: dentetianhoun@gmail.com

herbaceous plants are poor in nutrients, or even non-existent. Added to this are the shortage of crop residue stocks and the high cost of agro-industrial by-products during the lean season. This fodder deficit prevent animals from covering their maintenance and production needs.

In this context, ligneous fodder plants constitute an auxiliary fodder because of their high nutritive value combined with their availability in the dry season (Sanon *et al*., 2014). Similarly, certain forage ligneous plants also contribute to the management of certain pathologies such as gastrointestinal parasitosis of domestic livestock in rural Burkina Faso (Kaboré, 2009 ; Zabré, 2018). However, woody species are subject to overexploitation, particularly multipurpose species, which are the most preferred by rural populations (Sewade, 2017). These multipurpose species are used in native pharmacopoeia, construction, handicrafts, carpentry, sawmills and as firewood for cooking.

This is the case for forage ligneous plants such as *C. micranthum* and *S. latifolius*, whose use is increasing because of their an the lmintic effect on small ruminants (Tianhoun *et al*., 2023) and because of overgrazing resulting from the increase in cultivated land and the growth in ruminant livestock (Silue *et al*., 2014). In the context of social development focused on poverty alleviation, knowledge of vulnerable species is an important step towards integrating the needs of local populations intodecision-making on sustainable plant resource management. Consequently, vulnerability assessment, taking into account anthropogenic factors, is a major imperative for the success of sustainable plant resource management actions (Traoré *et al*., 2011). Hence the present study to assess the impact of traditional uses of *C. micranthum* and *S. latifolius* on their vulnerability with a view to proposing solutions for the sustainable conservation of the two plants in the Bwa community regions of Burkina Faso.

MATERIALS AND METHODS

Area of study

The study took place from November 2022 to January 2023 in two localities (Moundasso and Massala) in the urban commune of Dédougou (12°27'0" N and 3°27'28" W) located in the Boucle du Mouhoun region, which covers an area of 1352.56 km2 (figure 1). It has a Sudano-Sahelian climate with rainfall between 600 mm and 900 mm in the wet season (May to September) and a dry season (October to April) marked by the harmattan (PIF, 2017). Temperatures in the urban commune have an annual average of 29°C with wide variations from 16°C to 25°C in the cold dry season (December to January) and 31°C to 38°C in the hot dry season (March to June) (MHU, 2012). The vegetation consists of woody to shrub by savannahs including woody species such as *Faidherbia albida* (Gumtree), *Combretummi cranthum* or Kinkeliba, *Guiera senegalensis* (redappletree), *Lannea microcarpa* (Grapetree), *Parkiabi globosa* (Dwarftree), *Vitelaria paradoxa* (Shea), *Terminalia avicennioides*, *Combretum glutinosum* (MHU, 2012) and herbaceous genus *Andropogon gayanus*, *Digitaria horizontalis*, *Eragrostistremula*, *Pennissetum pedicellatum* and *Loudetia togoensis* (Traoré, 2018). The urban commune of Dédougou comprises 37 administrative villages with 123,973 inhabitants (RGPH, 2022), the majority of whom are ethnic Bwaba and indigenous Mossi, Gourounsi, Bobo, Marka, Peulh, Samo and Kô. Agriculture, livestock breeding and fishing are the main activities of the resident populations (MHU, 2012).

Study Methods

A survey of producers in the Bwa community was combined with a floristic inventory survey. For the Bwa community survey, information was collected by conducting semi-structured, individual interviews with 60 individuals (randomly selected volunteers open to innovations in livestock production) from the two study sites. The questionnaire used concerned the use of *C. micranthum* and *S. latifolius* plants, their areas of use (animal and human), their method of collection, the organs used, together with the interviewee's views on the state of abundance of the species used, the causes of the scarcity of plant resources for the two plants and proposals for strategies for their conservation.

For the dendro metric surveys, random inventory surveys were carried out to validate the responses of the producers surveyed. To this end, inventory data were collected in 40 inventory plots measuring 50 m x 20 m, i.e. a surface area of 1,000 m2 per plot. The minimum distance between two plots on the same axis varied between 300 and 500 m. Within each large plot, five 25 m2 (5 x 5 m) sub-plots were delimited to determine regeneration. In each large plot, all plants of both species were measured. To take account of natural regeneration, all stumps prouts and any ground cover were counted. Measurements were taken on the number and height of plants. The data collected were used to calculate species averages for the following structural parameters: a) density, b) basal area, c) cover ratio and diameter class structure. For diameter class structure, plants were grouped into 10 cm diameter classes.

The calculations were based on the following formulas:

- Density: The density of a species represents the number of individuals of the species per unit area.

- Determination of trunk diameter of mature plants :

$$\text{Circonference}(C) = \pi * \text{Diameter (D)} \quad \text{where}$$

$$\text{Diameter}_{(m)} = \left[\frac{C}{\pi}\right]/100$$

- Calculation of the average density of individuals (dm) Ouédraogo *et al*. (2009) :

$$\text{dm (indiv/ha)} = \frac{\text{number of individual/species/axis}}{\text{number of plots/species/axis}} * 10$$

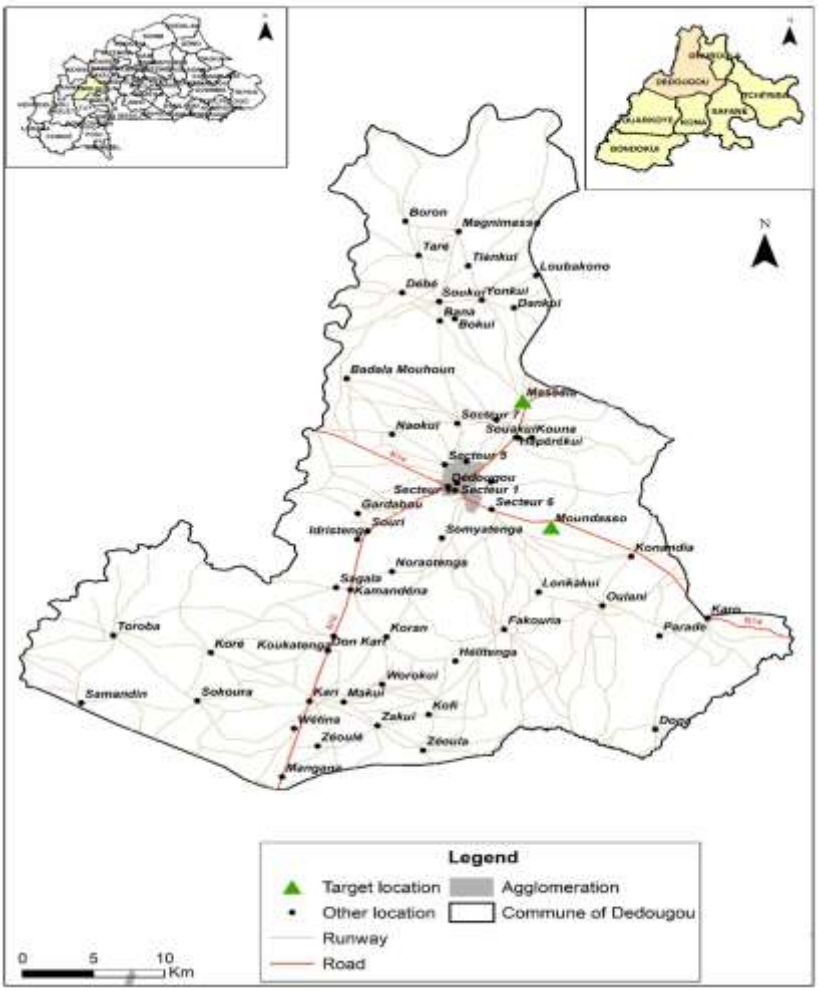

Figure 1. Geographical location of Massala and Moundasso in the urban district of Dédougou, Burkina Faso.

- basal area: this corresponds to the sum of the horizontal sections of the trunks, conventional lytaken at 1.30 m above ground level. It can therefore be calculated for the stand as a whole, by species or by groups of species, and enables us to assess the species' dominance. It's a question of determining whether we're dealing with small or large trees (Bognounou, 2009):

- Calculation of basal area per plant :

The basal area (m^2/ha) is calculated according to the following equation:

$S = \pi r^2 r = D/2St = \left[\frac{\pi * D^2}{4}\right]$ → with S= circle area, **r** = circle radius, **St** = basal area (m^2 ha^{-1}) et **D** = diameter 1m30 aboveground (m).

- Calculation of mean basal area (Sm) :

$$Sm\ (m^2/ha) = \frac{\sum basal\ area/species/axis}{number\ of\ plots/species/axis} * 10$$

The crown ratio is the area of the tree crown projected vertically onto the ground (Ngom *et al*., 2013). It varies according to the different zones, as its value depends strongly on the presence of large trees with wide crowns. It is expressed in %:

The crown ratio

$$T(x) = \frac{average\ cover\ of\ each species/site}{Number\ of plots}$$

Statistical analysis

The data collected were manually tabulated before being entered using the Windows 10 Excel 2016 spreadsheet program. They were then used to perform a descriptive analysis by calculating the percentages and means (± standard deviation) of the parameters measured, which were compared by one-way analysis of variance using the Student Newman Keuil test at the 5% threshold. All analyses were performed using Stat View for Windows (version 4.57).

RESULTS AND DISCUSSION

The people surveyed in the Bwa community were mostly men (83.3%) and women (16.7%), agropastoralists (95%) and herders (5%), with an average age of 44 ± 9 years. Their practiced religions were Catholicism (63.3%), Animism (18.4%), Protestantism (10%) and Islam (8.3%). In terms of education, these people had primary (90%) and secondary (10%) levels. The reasons that led respondents to engage in their activities as agropastoralists and livestock breeders were the search for money (83.3), passion for the activity (11.7%) and obtaining organic manure (5%). Their knowledge of the use of forage plants was acquired from their parents (91.7%), from training received (3.3%) or from an innate gift (5%). The interests of the people surveyed are diverse and varied for both plants. In animal feed, *C. micranthum* is much more widely used as fodder for ruminants (50%) than *S. latifolius* (26.7%). In traditional veterinary pharmacopoeia, *S. latifolius* is more widely used (56.6%) than *C. micranthum* (13.3%). In the treatment of human diseases, *C. micranthum* (20%) is more widely used than *S. latifolius* (16.6%). In addition, the *C. micranthum* plant is also used in handicrafts (10%) and as firewood for cooking (6.7%).

The parts of the two plants exploited by the people surveyed in the study are mainly leaves (80% and 83% respectively for *C. micranthum* and *S. latifolius*), roots (9% and 1.7% respectively for *S. latifolius* and *C. micranthum*) and bark (8% for *S. latifolius* and 5% for *C. micranthum*). In addition to these organs, *C. micranthum* stems (13.3%) are used in handicrafts. All these organs of both plants are obtained by manual pruning by most agro pastoralists (85.2%), pruning with the daba (9.8%) and pruning with the machete (5%). Mature plants (91.7%) are preferred to young plants (8.3%). For the treatment of pathologies, plant organs are used in decoction (95% and 91% respectively for *C. micranthum* and *S. latifolius*), maceration (4%) or powder (3.2%). Treatments are applied orally (100% and 96% respectively for *C. micranthum* and *S. latifolius*) and locally (4% for *S. latifolius*). In the treatment of livestock diseases, particularly ruminant diseases, respondents claimed to use both plants to treat several diseases, including internal parasitosis (85.25% and 81.97% of respondents respectively for *C. micranthum* and *S. latifolius*) (Figure 2). As for human pathologies, various uses were cited, including malaria, hypertension, digestive disorders, infantile diarrhoea, fever and haemorrhoids (Figure 3).

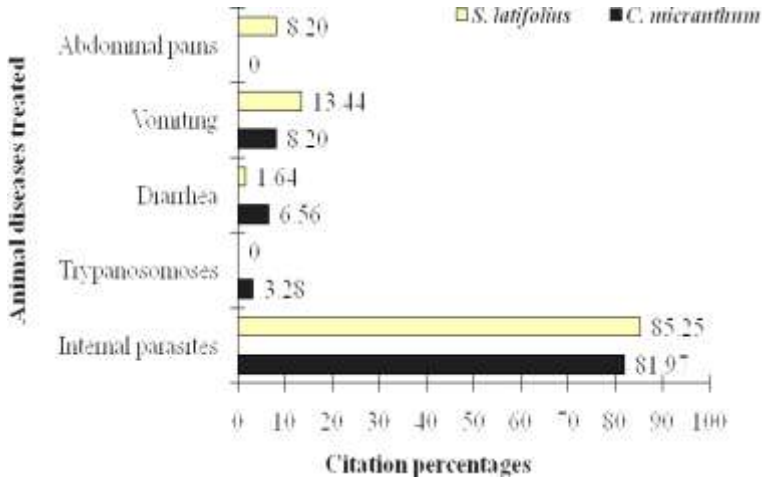

Figure 2. Animal diseases treated with *C. micranthum* and *S. latifolius* by study respondents.

Table 1. Density (D), basal area (St) and cover ratio (Tr) of the two plants in the study area.

Species	Parameters		
	D	St	Tr
C. micranthum	22.2 ± 14.5[a]	132.92 ± 151.7[a]	41.35[a]
S. latifolius	10.04 ± 5.8[b]	655.83 ± 715.1[b]	73.55[b]

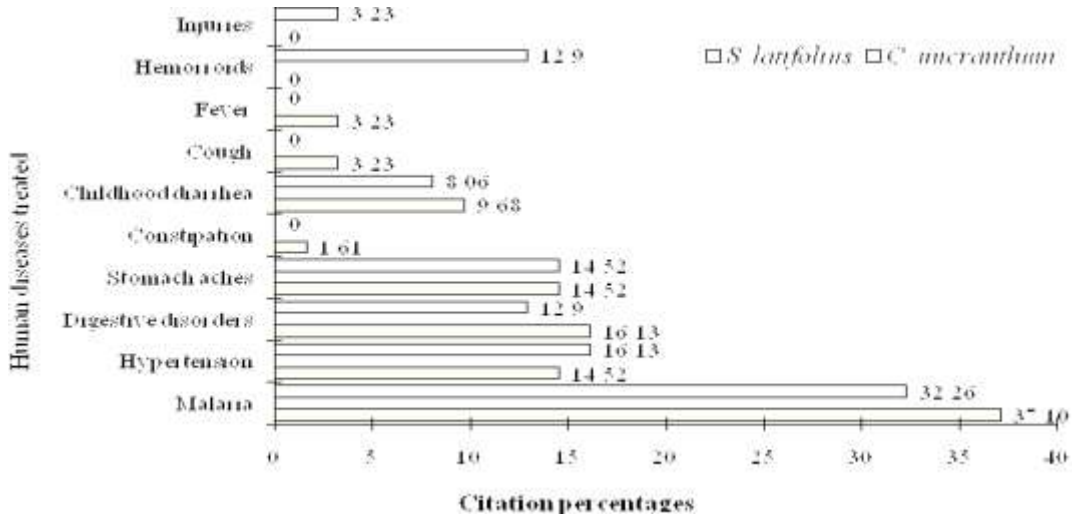

Figure 3. Human diseases treated with *C. micranthum* and *S. latifolius* by people surveyed in the study.

According to the people surveyed, both plants play a role in maintaining environmental balance (71.7%), and are also sources of food (18.3%) and income (10%). Faced with the problems of disappearing forage plants (93.3%) and the existence of diseased plants (6.7%), they proposed two safeguard solutions: the rational use of forage plants (96.7%) and reforestation (3.3%) to gradually replace forage resources threatened with extinction. To provide a better framework for the use of *C. micranthum* and *S. latifolius* plants, they called for awareness-raising sessions on good usage practices (95% and 83% respectively for *C. micranthum* and *S. latifolius*) and the creation of community gardens (5% and 17% respectively for *C. micranthum* and *S. latifolius*). Compared with the *S. latifolius* plant, the *C. micranthum* plant showed a significant increase ($p < 0.05$) in the density of the number of individuals per hectare (22.2 vs. 10.04 indv/ha respectively) in the study. On the other hand, the *S. latifolius* plant had a higher cover rate (73.55%) than the *C. micranthum* plant (41.35%). Moreover, in terms of basal area, *S. latifolius* (655.83 m²/ha) was significantly ($p < 0.05$) higher than *C. micranthum* (132.92.83 m²/ha) (Table1). The classic distribution of trunk diameters for both plants shows three classes with large numbers of individuals (Figure 4). These are classes [20-30[, [30-40[and [40-50. Examination of the graphs shows that the regeneration capacity of *C. micranthum*is greater than that of *S. latifolius* (Figure 5). The greatest average number of regenerations for *C. micranthum* seems to be between [0-75[cm in height. For *S. latifolius*, on the other hand, there are many more tall plants [175-200[cm than young plants [0-25[cm.

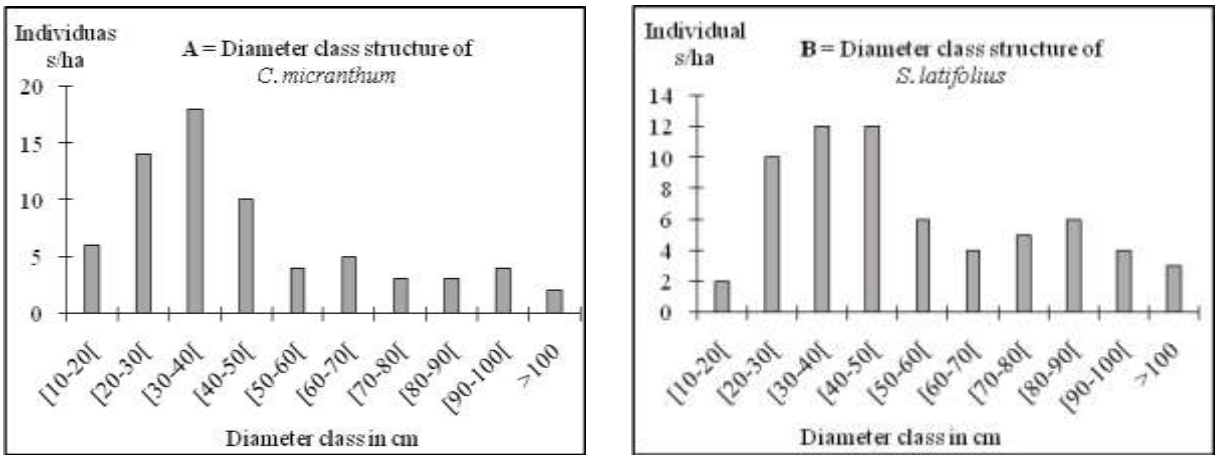

Figure 4.Diameter class structure of *C. micranthum* (A) and *S. latifolius* (B) plants.

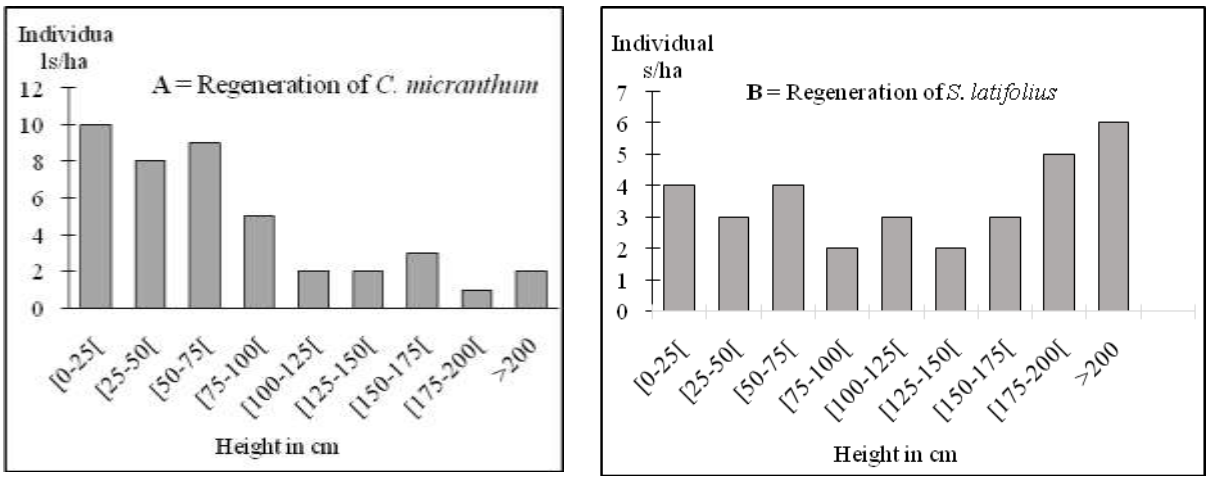

Figure 5. Average number of regenerations as a function of plant size for *C. micranthum* (A) and *S. latifolius* (B).

Rural producers, especially those in the Bwa community, are heavily dependent on woody plant resources such as *C. micranthum* and *S. latifolius* to meet their human and livestock needs. It is therefore essential to assess the availability and use of these two species, in order to manage them more sustainably with a view to their conservation. The results of the survey revealed that *C. micranthum* and *S. latifolius* plants are widely used in animal feed as fodder and in traditional pharmacopoeia for the treatment of animal and human pathologies. These same observations have been made by several African authors (Cissé *et al*., 2020; Badjaré *et al*., 2021. *C. micranthum* stems are also used in handicrafts and as firewood. Badjaré *et al*. (2021), in their study on the vulnerability of wood resources in Togo, confirm this use of *C. micranthum* by people living in protected areas in the savannah region. For both plants, leaves are the most exploited parts (80% and 83% respectively for *C. micranthum* and *S. latifolius*), compared with bark (8% for *S. latifolius* and 5% for *C. micranthum*) and roots (8.3% and 1.6% respectively for *S. latifolius* and *C. micranthum*). This claim corroborates the findings of several authors (Sarr *et al*., 2013; Dione *et al*., 2020) whoob served in their studies that leaves are the most consumed parts of woody plants. The preference for using leaves is certainly linked to their ease of access on plants, but also to their high content of nutrients and bioactive principles of food and medicinal interest.

In the study, traditional remedies formulated with *C. micranthum* and *S. latifolius* plants for the management of pathologies are administered mainly orally following decoction or maceration (4%) or by local application from powders. Decoction and maceration remain the main preparation methods used by african populations (Garba *et al*., 2019; Tianhoun *et al*., 2023). Furthermore, the predominance of oral administration is due to the ease with which the medicinal substances in traditional remedies can be deposited directly inside the body. This observation is in agreement with Benarba *et al.* (2014) and Chermat *et al*. (2015), whore ported that the oral route is the most dominant in the administration of various medicinal plants. In veterinary medicine, the agropastoralists and breeders in the study claimed to use traditional remedies to treat internal parasitosis in ruminants, with *C. micranthum* (85.25%) being used more than *S. latifolius* (81.97%).

Studies by Garba *et al*. (2019) and Ogni *et al*. (2014) have also reported that *C. micranthum* and *S. latifolius* plants are used to treat ruminant parasitosis in southwest Niger and Benin respectively. In human medicine, pathologies such as malaria, hypertension, digestive disorders, infantile diarrhoea, fever and haemorrhoids are treated with preparations made from the two plants in Togo (Badjaré *et al*., 2021). In the north of the republic of Côte d'Ivoire, people also use *S. latifolius* root bark to treat malaria (Cissé *et al.*, 2020).

With the inventory of both species in the study, the parameters measured provide an insight into the current population structures of *S. latifolius* and *C. micranthum* and their regeneration capacities. Analysis of the data collected revealed that the stands of both plants present a low density in the study environment (10 and 22 individuals/ha). These low values could be explained by the fact that field trees are increasingly cut down to satisfy the daily needs of the population, particularly for energy wood (Yaméogo *et al*., 2019). These results differ from those obtained by Paré (2008) on the diversity of open forests in southern Burkina Faso. This difference in density could be explained by the fact that the study area is an agricultural zone with a lot of space occupied by agriculture. To this could be added the anthropic pressure through over exploitation and abusive logging and the climatic impact (drought) observed in the study area.

The distribution of *C. micranthum* seems to show that this plant population has a large number of young plants in the 10-40 cm diameter classes. This is an indicator of good regeneration (Zegeye *et al*., 2006). In contrast, the *S. latifolius* population has a low proportion of young seedlings. According to Diallo *et al*. (2012), the presence of scattered individuals shows that populations develop under difficult climatic conditions, aggravated above all by intense anthropic action through increasing livestock pressure and abusive logging. This situation is more evident in the *S. latifolius* species than in the *C. micranthum* species in the study area. Cover rates are low for both plant species (41.35% and 73.55%). Most individuals of both species are practically the same size, and the high human pressure on them means that even if individuals produce flowers and fruit, seedlings will not succeed in establishing themselves.

CONCLUSION

In conclusion, the study revealed that the *C. micranthum* and *S. latifolius* plants are species known and used by the local Bwa population of Moundas so and Massala. They use several organs, including leaves, bark, stems and roots, for medicinal purposes, handicrafts, fodder and fuel wood. These numerous uses mean that these species are over exploited with high anthropic pressure in the study area and could be considered as vulnerable species. The results of the dendrometric survey carried out confirm this. Faced with this situation, it is important to disseminate good methods for exploiting the organs of these plants in the study area, in order to contribute to their sustainable conservation/preservation. In this respect, the leaves, which are known to contain more nutritive substances and secondary metabolites active in combating pathologies, could be favoured to avoid destroying the two plants in the study by exploiting the roots and bark.

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REFERENCES

Badjaré B., Folega F., Akpagana K., Woegan Y. A., Atakpama W., WalaK. & Akpagana W. (2021). Vulnérabilité des ressources ligneuses en lien avec les différentes formes d'usages au Togo: cas du paysage des aires protégées Doungh-fosse aux lions (région des savanes). *Revue Agrobiologia*, 11(2), 2552-2565.

Benarba B., Meddah B. &Tir Touil A. (2014). Response of bone resorption markers to *Aristolochia longa* intake by Algerian breast cancer post menopausal women. *Advances in Pharmacological and Pharmaceutical Sciences,* 820589.

Bognounou F. (2009). Restauration écologique et gradient latitudinal : utilisation, diversité et régénération de cinq espèces de Combretaceae au Burkina Faso. Thèse Doct., Université de Ouagadougou, 179 p.

Chermat S. &Gharzouli R. (2015).Ethnobotanical study of medicinal flora in the North East of Algeria, An empirical knowledge in Djebel Zdimm (Setif). Journal *of Material Sciences and Engineering,* 5(5), 9-26.

Cissé A., Ouattara M., N'guessan E. A. &Abrou J.E.N. (2020). Diversité végétale et usages des plantes dans une zone de savane soudanienne : Cas de la localité de Ferkessédougou (Nord, Côte d'Ivoire). *International Journal of Biological and Chemical Sciences.* 14(8), 2807-2825.

Diallo A., Agbangba E.C., Thiaw A. &Guisse A. (2012). Structure des populations d'*AcaciaSénégal* (L.) Willd dans la zone de Tessékéré (Ferlo nord), Sénégal. *Journal of Applied Biosciences,* 59, 4366-4374.

Dione A., Sarr O., Ngom S., Diallo A. &Guisse A. (2020). Perceptions pastorales des ligneux fourragers par les agropasteurs et les transhumants au centre du Sénégal. *International Journal of Biological and Chemical Sciences*, 14 (3), 772-787.

Food and Agriculture Organization of the United Nations (FAO). (2019). Le devenir de l'élevage au Burkina Faso. Défis et opportunités face aux incertitudes, 45 p.

Garba A.R.I., Adakal H., Abasse T., Koudouvo K., Karim S., Akourki A., Gbeassor M. &Mahamane S. (2019). Etudes ethnobotaniques des plantes utilisées dans le traitement des parasitoses digestives des petits ruminants (ovins) dans le Sud-Ouest du Niger.

Kaboré A. (2009).Activité anthelminthique de deux plantes tropicales testées *In vitro* et *In vivo* sur les strongles gastro-intestinaux des ovins de races Mossi du Burkina Faso. Thèse de Doctorat Unique de l'Université Polytechnique de Bobo-Dioulasso, Burkina Faso. 144 pages.

Ministère de l'Habitat et de l'Urbanisme (MHU).(2012). Schéma directeur d'aménagement et d'urbanisme de la ville de Dédougou (Horizon 2030). Rapport Définitif. 385 Pages.

Ministère des Ressources Animales (MRA).(2004). Deuxième Enquête Nationale sur les du Cheptel (ENEC-II). Résultats et Analyses, 27p.

Ministère des Ressources Animales (MRA).(2011b). Contribution de l'élevage à l'économie et à la lutte contre la pauvreté, les déterminants de son développement - Ouagadougou / Burkina Faso, 79 p.

Ministère des Ressources Animales et Halieutiques (MRAH). (2019). Annuaire des statistiques de l'élevage, 2018, 140 p.

Ngom D., Fall T., Sarr O., Diatta S. &Akpo L.E. (2013). Caractéristiques écologiques du peuplement ligneux de

la réserve de biosphère du Ferlo (Nord Sénégal). *Journal of Applied Biosciences,* 65, 5008-5023.

Ogni C. A., Kpodekon M.T., Dassou H.G., Boko C.K., Koutinhouin B.G., Dougnon J.T., Youssao A.K.I., Yedomonhan H. &Akoegninou A. (2014). Inventaire ethno-pharmacologique des plantes utilisées dans le traitement des pathologies parasitaires dans les élevages extensifs et semi-intensifs du Bénin. *International Journal of Biological and Chemical Sciences.* 8(3), 1089-1102.

Ouédraogo A. (2006). Diversité et dynamique de la végétation ligneuse de la partie orientale du Burkina Faso. Thèse de doctorat, Université de Ouagadougou (Burkina Faso), 195 p.

Ouédraogo O., Thiombiano A., Hahn-Hadjali K. &Guinko S. (2009). Diversité et dynamique de la végétation ligneuse juvénile du Parc National d'Arly (Burkina Faso). *International Journal of Botany and Horticulture Research*, 64(2), 257-278.

Paré S. (2008). Land Use Dynamics, Tree Diversity and Local Perception of Dry Forest Decline in Southern Burkina Faso, West Africa, 79 p.

Programme d'Investissement Forestier du Burkina Faso (PIF). (2017). Notice communale de Dédougou : Résultats des diagnostics socio-fonciers et des planifications participatives. 15 p.

Recensement Général de la Population et de l'Habitation du Burkina Faso (RGPH) (2022). Monographie de la région de la Boucle du Mouhoun. 204p.

Sanon H.O., Savadogo M., Tamboura H.H. &Kanwé B.A. (2014). Caractérisation des systèmes de production et des ressources fourragères dans un terroir test de la zone soudanienne du Burkina Faso, *VertigO*, 14, (2), 1-15.

Sarr O., Diatta S., Gueye M., Ndiaye P. M., Guisse A. &Akpo L.E. (2013). Importance des ligneux fourragers dans un système agropastoral au Sénégal (Afrique de l'ouest). *Revue de Medecine Veterinaire*, 164 (1), 2-8.

Sewade I.C. (2017). Diversité, biomasse foliaire des ligneux fourragers et capacité de charge des terres de parcours des zones de transition Guinéo-Congolaise/Soudanienne du Bénin. Thèse de doctorat, Sciences Agronomiques, Aménagement et Gestion des Ressources Naturelles, Université d'Abomey-Calavi, 214p.

Silue N., Fofana J.I., Silue S., Diarrassouba N., Kouassi A.F. &Kouakou K. (2014). Identification des espèces ligneuses utilisées dans l'alimentation des bovins dans la région du Poro (nord de la côte d'ivoire). *Agronomie Africaine*, 26 (3), 217-229.

Tianhoun D.F., Meda N.T.R., Konate A., Kabore A., Tamboura H.H. &Belem A.M.G. (2023).Ethnoveterinary study on livestock practices and the use of medicinal plants against gastrointestinal parasites of small ruminants in the Bwa community in Burkina Faso. *International Journal of Veterinary Sciences and Animal Husbandry*, 8(4), 100-107.

Traore L., Ouedraogo I., Ouedraogo A.&Thiombiano A. (2011). Perceptions, usages et vulnérabilité des ressources végétales ligneuses dans le Sud-Ouest du Burkina Faso. *International Journal of Biological and Chemical Sciences*, 5(1), 258-278.

Traoré M. (2018). Analyse floristique des formations ripicoles du corridor forestier de la Boucle du Mouhoun (cas de la province du Mouhoun). Mémoire de fin de cycle, Ingénieur de développement rural, Université nazi Boni, Burkina Faso, 86 pages.

Yaméogo G., Ouédraogo H. &Yelemou B. (2019). Dynamique de la biodiversité des parcs agroforestiers de Vipalogo en zone nord soudanienne du Burkina Faso. *International Journal of Biological and Chemical Sciences*, 13(6), 2765-2776.

Zabré G. (2018).Qualités antiparasitaires et nutritionnelles des plantes *Acacianilotica* var andansonii (Guill. etPerr.) O. Ktze et *Acaciaraddiana* (Savi) Brenan exploitées dans l'élevage des petits ruminants en zone sahélienne du Burkina Faso. Thèse de Doctorat, Université Ouaga I Pr Joseph KI-ZERBO, Ouagadougou, Burkina Faso, 107 p.

Zegeye H.L., Teketay D. & Kelbessa E. (2006). Diversity, regenerationstatus and socio-economic importance of the vegetation in the islands of Lake Ziway, south central Ethiopia. *Flora*, 201(6), 483-498.