



# Therapeutic Uses of False Sesame (*Ceratotheca sesamoides* Endl.) in the Sudanian and Sudano-Sahelian Part of Burkina Faso

Dramane KABORE <sup>a++\*</sup>, Pingawindé SAWADOGO <sup>b#</sup>  
and Renan Ernest TRAORE <sup>a†</sup>

<sup>a</sup> Université Joseph KI-ZERBO, Équipe Génétique et Amélioration des Plantes, Laboratoire Biosciences, Unité de Formation et de Recherche en Sciences de la Vie et de la Terre, 03 BP 7021, Ouagadougou 03, Burkina Faso.

<sup>b</sup> Centre Universitaire Polytechnique de Tenkodogo (CUP/T), Université Thomas SANKARA, Tenkodogo, Burkina Faso.

## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

This study investigates the ethnomedicinal knowledge of false sesame (*Ceratotheca sesamoides* Endl.) among rural populations in Burkina Faso, with a focus on how this knowledge varies across social parameters such as ethnicity, gender, and age. The primary objective is to assess the extent

<sup>++</sup>PhD in Plant Genetics and Breeding;

<sup>#</sup>Assistant Professor in Genetics and Plant Breeding (PhD);

<sup>†</sup>Full Professor in Genetics and Plant Breeding;

\*Corresponding author: Email: [dramanekabore61@gmail.com](mailto:dramanekabore61@gmail.com);

and distribution of local knowledge concerning the medicinal uses of this underutilized plant, particularly regarding ailments for which it is used as a remedy. The study specifically examines the plant parts employed for therapeutic purposes and the variations in knowledge among different demographic groups. Data were collected through semi-structured ethnobotanical interviews conducted with 240 participants representing 12 distinct ethnic groups. Quantitative analyses were performed using use indices, Shannon diversity indices, and Chi-square tests to identify significant patterns of knowledge distribution. The results showed that gender and age significantly affected knowledge about the medicinal uses of false sesame ( $p = 0.034$  and  $p = 0.004$ , respectively), while ethnicity did not have a significant effect. However, the Shannon indices demonstrated a high diversity of knowledge across all demographic groups, indicating a widespread and rich ethnomedicinal understanding of this plant. These findings highlight the importance of preserving traditional knowledge and suggest that false sesame holds potential for contributing to sustainable health care solutions and ethnopharmacological research in areas where access to modern medicine is limited.

**Keywords:** *Ceratotheca sesamoides*; traditional use; ethnic group; resource conservation; plant parts.

## 1. INTRODUCTION

Burkina Faso is a low-income country (Traoré *et al.*, 2022). This scarcity of financial resources has resulted in a poverty rate estimated at 40.1%, according to the new Human Capital Index established by the World Bank in 2024 (CPIA Africa, 2024). Although there is an increased sense of poverty, this has not prevented rapid population growth, especially in rural areas (CPIA Africa, 2024). As a result, populations in rural areas are more exposed to food insecurity. This sometimes leads to health crises to which the victims are unable to provide a curative response. However, certain plants found in rural environments serve as remedies for these ailments (Schultz *et al.*, 2021; Nzuki Bakwaye *et al.*, 2013; Leonard & Viljoen, 2015). Nevertheless, plants with high curative potential remain unknown to the younger generation. This lack of knowledge of therapeutic plants by the younger generation may be due to the absence of transmission of such knowledge from the older generation. To this end, the introduction of indigenous knowledge could herald a new era in traditional medicine, especially in developing countries. Numerous ethnobotanical studies have been carried out in Burkina Faso, but none has focused strictly on false sesame. Therefore, an ethnobotanical survey was conducted on false sesame in the Sudan-Sahelian and Sudanian zones of Burkina Faso. The aim of this study was to gather medicinal information on the use of false sesame from rural populations. Specifically, the objective was to assess the variation in indigenous knowledge of the uses of false sesame, particularly the diseases for which false sesame serves as a remedy, according to ethnic

group, sex, and age, using different parts of the plant.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

This study was conducted in four regions of Burkina Faso. These four regions are equally divided between the Sudan-Sahel climatic zone and the Sudanian climatic zone. In both climatic zones, rainfall ranges from 900 to 1,200 mm per year (Thiombiano & Kampmann, 2010; Tindano *et al.*, 2014). The Sudan-Sahelian zone is the largest in Burkina Faso, covering the central part of the country, and is characterized by annual rainfall of between 600 and 900 mm over four to five months, with temperatures ranging from 20°C to 30°C. The Sudanian zone is the wettest part of the country, with annual rainfall exceeding 1,100 mm. The rainy season in this area lasts four to five months, with average annual temperatures fluctuating between 20°C and 25°C. It is home to most of the country's forests, with gallery forests forming along watercourses. The climate in this zone supports the development of a denser savannah. Edaphically, the Sudanian zone contains ferruginous soils and eutrophic brown soils (Fontes & Guinko, 1995; Tindano *et al.*, 2014).

### 2.2 Description of *Ceratotheca sesamoides*

False sesame (*Ceratotheca sesamoides* Endl.) is a herbaceous plant that typically reaches a height of around 120 cm, although it can sometimes develop woody rhizomes for additional support (Sienebou *et al.*, 2012). Its

stems are upright and covered with fine hairs, with a coloration that can vary depending on environmental conditions and plant maturity. Interestingly, although the main stem is usually erect, false sesame often produces approximately 10 secondary stems that creep along the ground (Sienebou *et al.*, 2012; Brink & Belay, 2006). The leaves are simple and lack stipules, arranged opposite or nearly opposite on the stem, contributing to the plant's symmetrical appearance (Fig. 1). Leaf stalks measure about 6 cm for shorter leaves and up to 8 cm for longer ones (Stevens, 1990), and the leaf blades are lance-shaped with a serrated edge. The root system resembles that of cultivated sesame, featuring a prominent taproot surrounded by a dense network of lateral roots that help the plant absorb water and nutrients efficiently. This extensive root structure enables false sesame to thrive in diverse soil types, including the ferruginous and eutrophic brown soils of the Sudanian and Sudan-Sahelian zones. The plant's adaptability, combined with its medicinal potential, makes it a significant subject for ethnobotanical studies. Its resilience and ability to grow in challenging environments also highlight its role in local agro-ecological systems.

## 2.3 Data Collection

Data were collected in 2020 through semi-structured ethnobotanical surveys and individual

interviews conducted in selected localities. The method chosen was that used by Dossou *et al.* (2024) and Saoud *et al.* (2010), which involved showing the plant to respondents prior to the interview. To this end, the questions on the survey form focused on the medicinal importance of the plant and the diseases it is used to treat.

## 2.4 Statistical Analysis

The data obtained during the survey were entered into an Excel 2016 spreadsheet. After entry, the data were used to calculate frequencies using the same spreadsheet. A histogram and a pie chart illustrating the number of ethnic groups surveyed and the percentage of plant organs used were then produced. The data were subsequently analyzed using R version 3.3.3 software to perform the Chi-squared test of independence and to compute Shannon diversity indices for categorical uses. For this analysis, the significance threshold of the probability PPP associated with the Chi-squared test statistic was set at 5%. Additionally, the Shannon diversity index was used to estimate the specific diversity of uses according to locality, gender, and age. Diversity is considered low when the Shannon index values are close to 0. In contrast, Shannon index values approaching  $\ln(S)/\ln(S)$  indicate high diversity, where SSS represents the number of use categories.

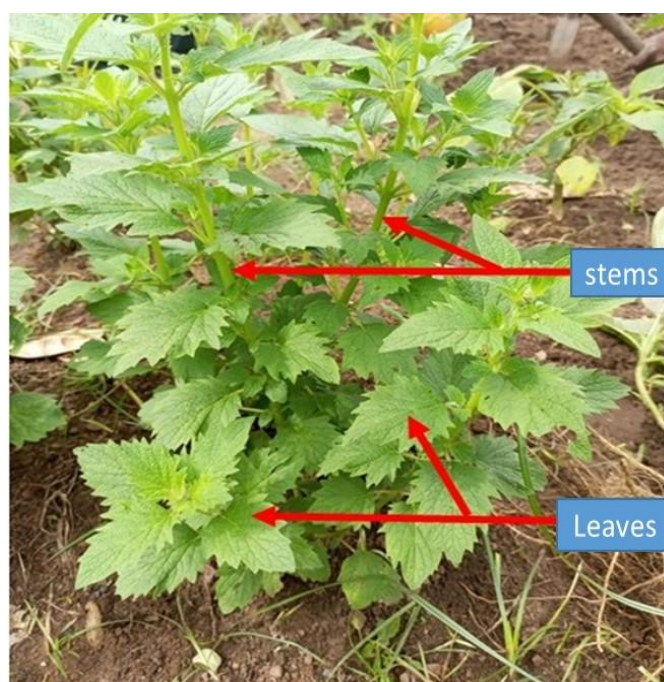


Fig. 1. *Ceratotheca sesamoides* plant

### 3. RESULTS

#### 3.1 Profile of Respondents

A total of 240 farmers from 12 ethnic groups were interviewed (Fig. 2). The ethnic groups with the highest representation were the Mossé (28%), followed by the Bwaba (25%) and the Gurunsi (18%). The least represented ethnic groups were the Dafing (2%), the Peuhl (2%), and the San (2%). Table 1 shows that the majority of respondents were over 50 years old (85.41%) and predominantly female (63.75%).

#### 3.2 Medicinal Importance

False sesame is one of the species most coveted by the populations surveyed. Approximately 65% of the surveyed population use false sesame for health care purposes. In fact, all the Dagara and

Peuhl respondents reported using the species for self-treatment. Moreover, with the exception of the Djan ethnic group, the majority of the ethnic groups surveyed expressed satisfaction with the health benefits obtained from *C. sesamoides*. To this end, several illnesses are treated using infusions of the leaves, leaf juice, leaf paste, and charred stems (Table 2).

Shannon's diversity index showed variation in the use of *Ceratotheca sesamoides* according to gender ( $H' = 0.77$ ), age ( $H' = 0.82$ ), and ethnic group ( $H' = 0.63$ ) across all surveyed populations. In addition to the Shannon diversity index, the Chi-squared test revealed a significant difference in the medicinal use of the species between age groups, genders, and ethnic groups (Table 3). Figure 3 highlights that leaves are clearly the predominant plant organ used, with a proportion significantly higher than that of stems.

**Table 1. Distribution of respondents by gender, age, function and religion**

Factors	Number of respondents	Factors Proportion of sample (%)
Age categories		
≤ 35 years	16	6,66
[36 years; 49 years]	19	7,91
≥ 50 years	205	85,41
Sex		
Women	153	63,75
Male	87	36,25

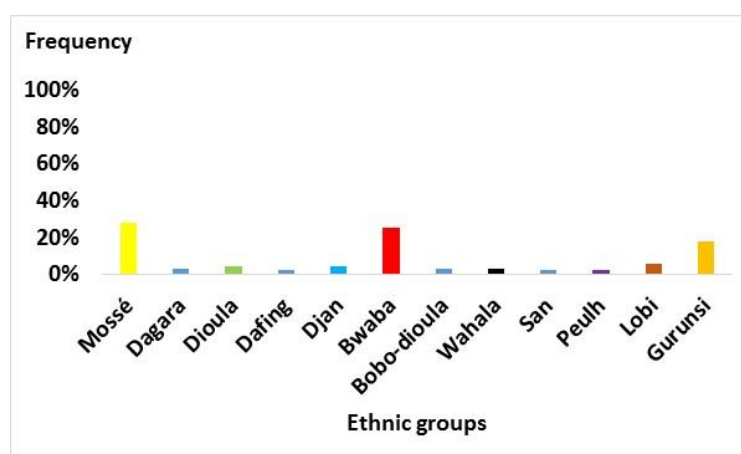
**Table 2. Therapeutic uses of *Ceratotheca sesamoides* (Endl.) by ethnic groups**

Ethnic groups	Recipes	length of treatment	Therapeutic uses
Bwaba, Gurunsi, Mossé, San, Lobi et Dan	Leaf infusion	One week's treatment, applied morning and evening	Treatment of furuncle, fontanel, panicitis and ringworm.
		Two days of treatment, applied morning and evening/day	Treatment for sore eyes, toothache, sore ribs and ulcers.
		One day's treatment, applied once during the course of the illness	Treatment of gastric ailments and malaria.
Bwaba	Paste of fresh leaves and charred stems	Two weeks of treatment, applied every three days	Treating incurable wounds.
		One day's treatment, applied once during the night.	Extraction of spines in the body.
Gurunsi	Fresh and dried leaf paste	One day's treatment, applied during the course of the illness.	Treats constipation, diarrhoea, snake bites and scorpion stings.
San	Mixing soil with leaf paste	Three weeks' treatment, applied morning and evening/day.	Treats neurological disorders.
Mossé, Dioula, Bwaba, Gurunsi	Aqueous leaf extract	Two days' treatment, applied morning and evening/day.	Treats conjunctivitis.
		One day's treatment, applied once during the course of the	Facilitates childbirth for women.

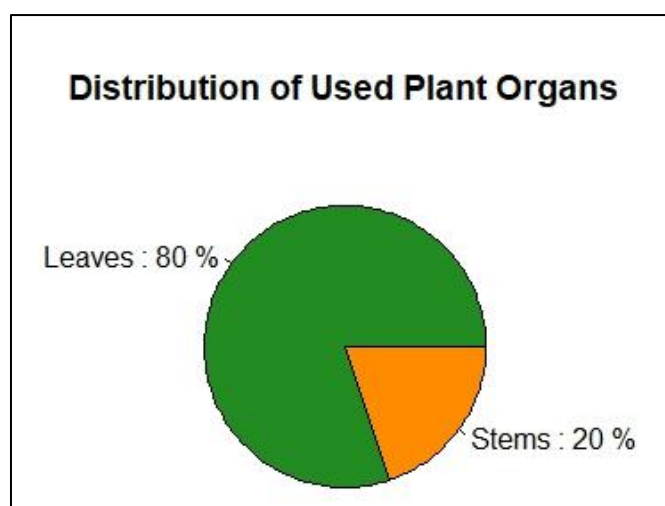
Ethnic groups	Recipes	length of treatment	Therapeutic uses
Mossé	Fresh leaf paste	One day's treatment, applied once during the course of the illness.	Gets rid of lice in the hair.
Peulhs	Leaf juice and paste	Two weeks' treatment, applied once a day.	Treats aches and fever, eliminates toxins from poisons.
		One day's treatment, applied once during the course of the illness.	Clears the animal's digestive tract and helps ruminants in difficulty.

**Table 3. Diversity of uses of *C. sesamoides* according to sex and age**

Factors	Test of Shannon (H')	Test of Khi <sup>2</sup> (p-value)
Knowledge of respondents on usage according to age	0,82	0,004
Respondents' knowledge of usage by gender	0,77	0,034
Respondents' knowledge of usage by ethnic group	0,63	0,072



**Fig. 2. Distribution of respondents by ethnic group**



**Fig. 3. Distribution of Used Plant Organs**

#### 4. DISCUSSION

The present study, based on the calculation of Shannon diversity indices, the Chi-square test, and the frequencies of medicinal use of *Ceratotheca sesamoides* according to ethnic group, age, and gender, made it possible to determine the level of knowledge about the use of the species. The results show that Shannon diversity indices reveal a high diversity of knowledge about the species within age groups, genders, and ethnic groups (Houëtchégnon *et al.*, 2015) (Seguena *et al.*, 2013) (Reyes-García *et al.*, 2004). Similar findings have been reported in previous studies on *A. digitata* in Benin (Atakpama *et al.*, 2012) (Avocèvou-Ayisso *et al.*, 2011; Dominique, 2002). The diversity of knowledge across age groups is thought to result from the transmission of ancestral cultural knowledge, as knowledge about the species is passed down from generation to generation within the same ethnic group. Similar observations were made by Houëtchégnon *et al.* (2015) and (Lira *et al.*, 2009) regarding the medicinal value of vegetable species. However, in this study, no differences were found between ethnic groups in the medicinal use value of *C. sesamoides*. This may be due to the cultural links among the 12 ethnic groups surveyed. It could be explained by the mobility of individuals between ethnic areas, ethnic mixing, and the sharing of knowledge between individuals from different ethnic groups (Adomou, 2005; Joel *et al.*, 2017). It is also important to consider cultural values, as ethnobotanical knowledge is influenced by cultural cross-fertilization. For this reason, cultural origin could be a factor to include in the evaluation of the medicinal value of *C. sesamoides*. From these surveys, the medicinal knowledge provided by ethnic groups about the species could support its conservation and enhancement within local communities. Additionally, as the Shannon index values are significant, they confirm that the species is highly valued as a medicinal plant by the populations (Akpi *et al.*, 2019; Djego *et al.*, 2012; Montgomery & Chazdon, 2001). People who use the species for medicinal purposes are more likely to be women, particularly those over the age of 50. This shows that older women possess more medicinal knowledge about the species. This finding may be linked to the fact that, due to their responsibilities as wives and mothers, older women in rural areas provide first aid using medicinal plants (Ngotta *et al.*, 2023; Mpondo *et al.*, 2017; Padonou, 2014). Their responsibility for their children and constant contact with them

make older women traditional practitioners by circumstance.

#### 5. CONCLUSION

The ethnobotanical study of *Ceratotheca sesamoides* across 12 ethnic groups reveals its significant role in traditional medicine, particularly through the use of leaf infusions, leaf paste, leaf juice, and charred stems. The observed variation in specific uses and the number of uses across ethnicities and generations provides important insights into the cultural transmission of medicinal knowledge and the plant's versatility in treating various ailments. These findings underscore the plant's potential as a valuable source of bioactive compounds, warranting further scientific investigation into its pharmacological properties. The diminishing knowledge among younger generations highlights the urgency of documenting and preserving this traditional knowledge. Promoting the rational use and conservation of *C. sesamoides* is crucial for ensuring its sustainable utilization and for integrating traditional medicinal practices into broader health care frameworks, especially in regions with limited access to conventional medicine.

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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