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Farmers' Knowledge and Interest Traits of *Hibiscus cannabinus* Grown in Burkina Faso

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Authors' contributions

This work was carried out in collaboration between all authors. Authors PBK and RET designed and supported financially the study. Author NS wrote the research protocol and gave practical advices for activities. Author VNK realized prospection-collecte and wrote the first draft of the manuscript. Authors ZK, MK and BS performed the statistical analysis, managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The present study aims to contribute to a better sociocultural knowledge of *Hibiscus cannabinus* through an inventory of the local knowledge and the identification of interest characters for farmers. Seventy-two (72) accessions were collected from fifty-six (56) villages distributed in seven (7) provinces. The information has been collected through semi-structured interviews. Twelve (12) vernacular names have been counted. Their denomination by the farmers is based on the phenotypic characters such as the cycle of the plant and the seeds origin. Meanwhile, the study revealed that the farmers get their seeds from parents and friends, by a direct withdrawal in the spontaneous and cultivated ecotypes, through donation or exchange, the purchasing to the market and the massale selection. This survey also revealed a net regression of *Hibiscus cannabinus* farming that is always practiced mainly by a minority of Mossi and Gurunsi. Indeed, these two

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ethnic entities use the leaves of this plant as vegetable-leaf for the cooking of the local dishes and even sell it in the local markets. The fibers and the seeds also constitute organs of interest for the local populations. They use it for the stringing and food. The results of this study have permitted to undertake the varietal improvement of the species according to the needs of the producers.

Keywords: Hibiscus cannabinus; local knowledge; Burkina Faso.

1. INTRODUCTION

Numerous wild plants, in protoculture and cultivated, are used as supplement food and they contribute to reduce African people poverty [1,2]. Among these species is *Hibiscus cannabinus*. The type or specie cultivated determine the use of the different parts: as food, traditional medicine or in craft industry [3]. Its leaves are consumed like vegetables leaves. Its contain a significant quantity of mineral salts (Ca, Mg, K, P, Na), trace elements (Fe, Al, Mn, Zn etc.) and amino acids such as aspartic acid, glutamic acid [4]. In Burkina Faso, *H. cannabinus* is regarded as an important socio-economic and cultural plant by the populace. Yet, the national research on the state of the phytogenetic resource for food and agriculture [5,6] reveals very little information about the state of its farming and its diversity. Its culture is practiced in association with other cultures in small fields around the slots [7]. Some studies show the extinction of this species and of the endogenous knowledge related to its usage [8]. So, it is imperative to initiate strategies of conservation of this vegetable-leaf. First of all, that requires the understanding of the rural practices on its diversity management, and the description of the local processes to nominate the vernacular appellation [9,10]. The present survey aims to make an inventory of knowledge and traditional expertise on the management of the species in Burkina. Specifically, (i) list the local knowledge on the rural management of the species; (ii) identify the characters of interest shown by the population and (iii) document a collection of *Hibiscus cannabinus* cultivars in Burkina Faso.

2. METHODOLOGY

2.1 Ethnobotanics Investigations and Sample Collections

Some prospecting collections have been conducted between March and May 2017 in the three climatic zones of the country. The support of provincial directors of agriculture (DPA) and the agents of the technical animation zones (ZAT) that are in touch with the farmers have helped to identify the provinces and the villages where *Hibiscus cannabinus* is cultivated. A questionnaire soliciting for information the number of locally cultivated varieties, the names of local varieties cultivated by farmers, the morphological interest characters for producers and consumers, the mode of seeds extraction, the plant cultivation period, the aim of its farming (consumption or selling), the seeds origin, the seedling and cultural practices mode, the seeds conservation methods and other different uses. The samples were collected labeled kept in envelopes. The exhaustive collection technic has been used while collecting among all producers of every village visited.

2.2 Statistical Analyses

XLSTAT 2016 software was used to estimate frequencies and averages of the different parameters evaluated. Thereafter, Excel 2010 software was used to construct the histograms illustrating the appreciation of the evolution of the cultural state and the organs preference level by the producers.

3. RESULTS

3.1 Cultural State of *Hibiscus cannabinus*

Seven (7) provinces have been identified like zones of culture of *Hibiscus cannabinus*. These provinces are Kadiogo, Koupéla, Nahouri, Oubritenga, Sanguié, Sissili and Yatenga, (Fig. 1). A total of 56 villages has prospected. Two hundred and twenty-four (224) people composed of men and women were administered with questionnaires. The number of producers vary from 4 (Yatenga) to 29 (Nahouri) (Table 1). The analysis of this table shows that the species is mainly cultivated by the men and by two ethnic groups. The ethnic group Mossi representing 41.67% of the producers and the ethnic group Gurunsi, 58.33% of the producers. The ethnic group Gurunsi is composed of three dialectic subgroups: Kasséna, Nuini and Lélé. A total of 72 accessions have been collected, of which sixty-nine (69) collected nearby producers, two (02) nearby tradesmen to the market and one (01) get in natural habitat. Most of these

investigations (84.34% of Mossi and 67.61% of Gurunsi) estimate that *H. cannabinus* farming is in net regress. Two systems of growing are practiced: the mixed culture (78.65% of the person investigated) in small fields (surfaces lower than 0.25 ha), in association with other crops such as maize, groundnut, vegetable carrot, okra, onion, sweet potato, sorrel and the amaranths or around the fields, serving in general to reduce winds pressure or to delimit the properties. The monoculture (either 11.98% of the persons investigated) practiced especially by gardeners. More or less 9.37% of producers practice monoculture and mixed culture.

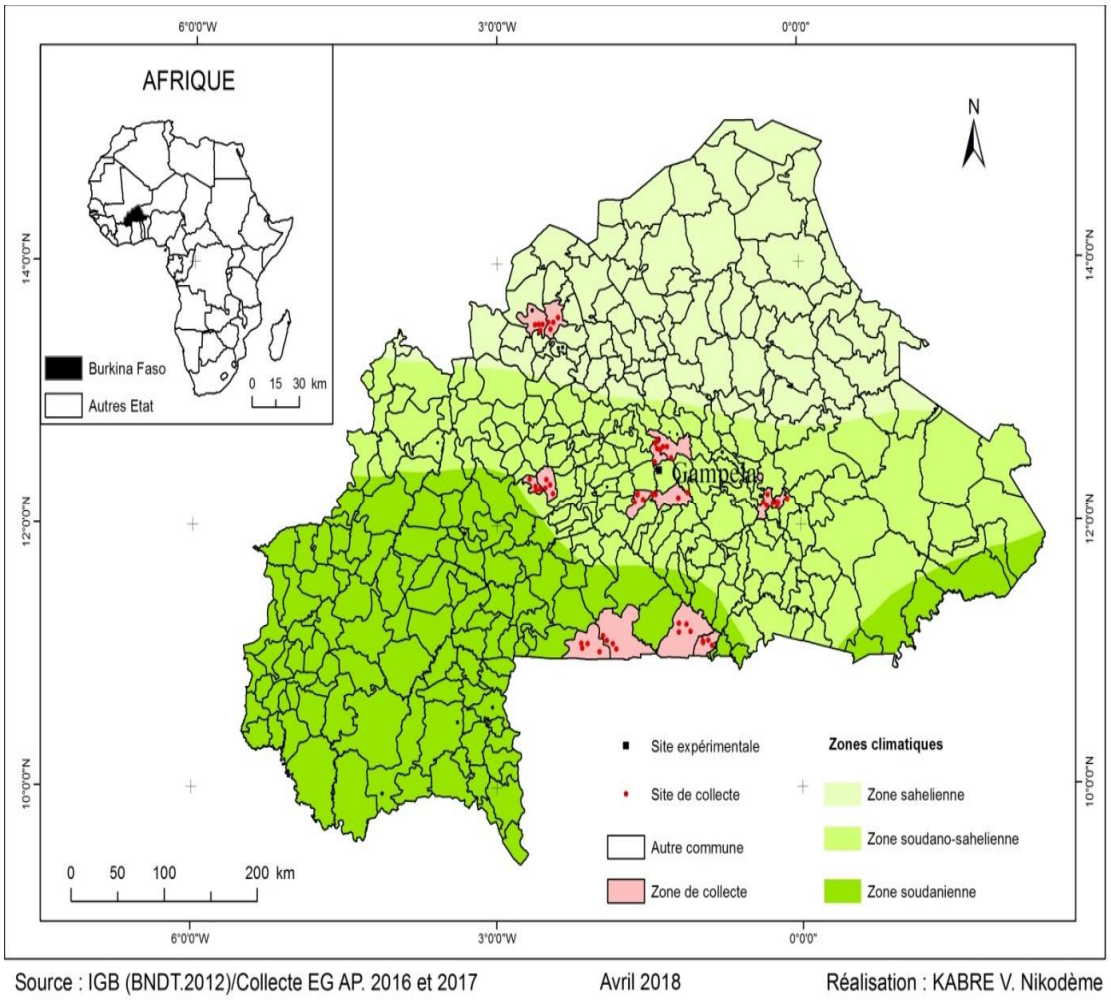

Fig. 1. Localization of prospecting-collection zones of *Hibiscus cannabinus* accessions

Table 1. Distribution of the producers according to province and sex (n=115 producers)

Sites of collection	Number of producers	Proportions of men (%)	Proportions of women (%)
Kadiogo	9	75	25
Kouritenga	25	78	22
Nahouri	29	60	40
Oubritenga	11	82	18
Sanguié	19	75	25
Sissili	18	50	50
Yatenga	4	68	32

3.2 Etymological Diversity and Denomination Criterion of *H. cannabinus*

The vernacular names of *Hibiscus cannabinus* varies according to the ethnic groups (Table 2). In the denomination of the morphotypes, the farmers refer to the source of the first seeds and to the phenotypic character of the plant as the colour and the size of the stem, the cycle of the plant. Thus, the callings for example by Mossis' "*Bèreng-pèlga*" meaning "white *Hibiscus cannabinus* " "*Bèreng-miougou*" that means" red *Hibiscus cannabinus* " characterized respectively by the white and red color of the stem. The appellation "*Pougtaré*" that means "long *Hibiscus cannabinus*" characterizes the large size of the stem. In terms of the cycle, we have the appellation "*Bèreng-raaga*" in mooré, or "*Kanza-nian*" in gurunsi-kasséna and "*Papan-tô*" in gurunsi-nuini, that means "male *Hibiscus cannabinus* "; this characterizes the morphotypes with a very precocious flowering. There is also the appellations "*Bèreng-gnanga*" in mooré, "*Kanza-bia*" in gurunsi-kasséna or "*Papan-zon*" in gurunsi-nuini that means «female *Hibiscus cannabinus* » that characterizes the morphotype with delaying flowering. Finally, the appellation "*Bim-bèrenga*" in mooré language that means "*Hibiscus cannabinus"* of **"**Bims*"* referring likely to the origin of the first seeds.

3.3 The Organs of Interests for the Producers and Consumers of Ethnic Mossi and Gurunsi

Fig. 2 gives level of preference of organs for the producers and consumers among the Mossi and Gurunsi producers. The leaves, the fibers and the seeds constitute the organs of interest at all ethnic groups (Fig. 2). Among these organs of interests, the leaves are the most favourite of the producers and consumers Mossi and Gurunsi. On the one hand, the plant is cultivated more for its leaves by the Gurunsi (69% as against 31% by the Mossi). They are used like vegetable-leaf in the preparation of the local dishes and are even sold in the local markets. On the other hand, the fibers are mostly used by the Mossi (66% as against 34% by the Gurunsi). They serve to manufacture some ropes, to make clothes of the masks called "*biiddu*" and in the funeral rituals to make the cadavers ready for the funeral. The seeds are also consumed more by the Mossi (55% as against 45% of the Gurunsi). They use it for the manufacturing of soumbala named "***Bicalga***" in mooré and ***"gio-sola"*** in Gurunsi-Lélé considered tastier than the soumbala makes on the basis of Néré seeds.

3.4 Seeds Acquirement and Conservation Mode of *Hibiscus cannabinus*

During the ethnobotanical investigations, we noticed four methods used to obtain the seeds. There is the direct withdrawal of the seeds way on the stems during the harvest. This is mainly used by the farmers of the provinces of Sissili (90.6%), Oubritenga (90.6%), Nahouri (78.1%) and Sanguié (68.7%). The massal selection, especially practiced by the gardeners in the province of Nahouri (18.8%). In this method the best are saved and to keep for seeds. The purchase and the exchange are methods which are specially practiced by farmers of the provinces of Kouritenga (59.4%) and Kadiogo (46.9%). The quantity of seeds needed by farmers vary according to their objectives

Table 2. Some vernacular names of *H. cannabinus* in local languages

N°	Ethnic group	Vernacular names
1	Mossi	*Bèrenga* *Bim-bèrenga* *Bèreng-miougou* *Bèreng-pèlga* *Bèreng-raaga* *Bèreng-gnan-ga* *Pougtaaré* *Kanza-nian*
2	Gurunsi	*Kanza-bia* *Papân-tô* *Papan-zon* *Pepana*

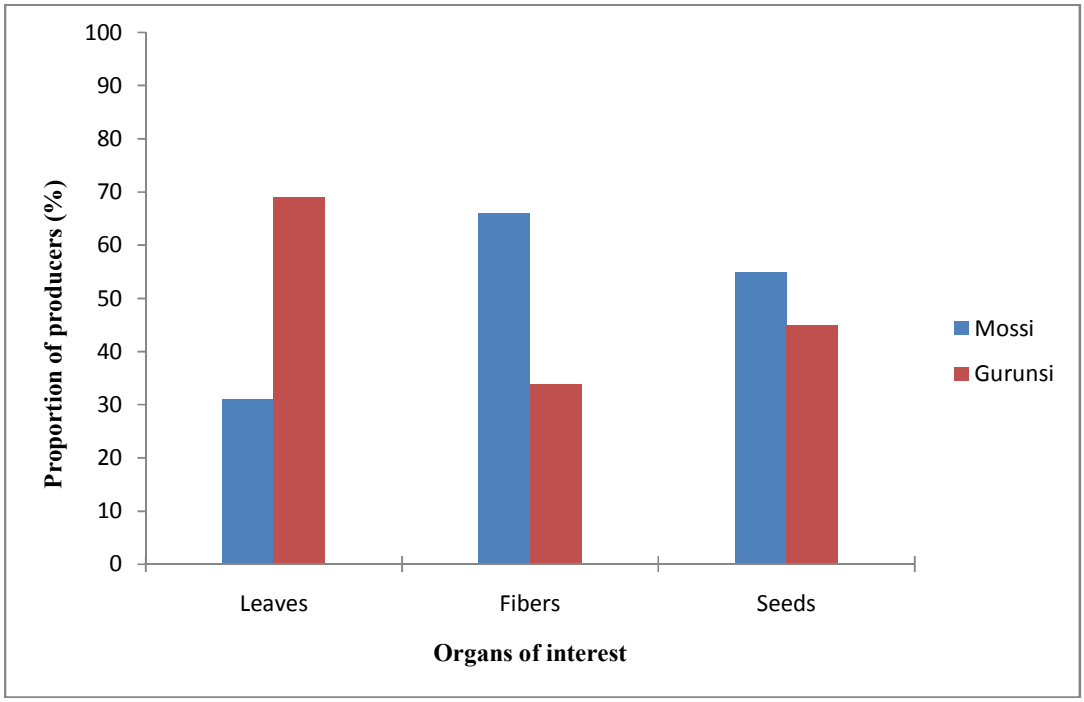

Fig. 2. Preference level indication of the organs by Mossi and Gurunsi producers and consumers

Seeds in sachets (a) **Ears hung at the attic (b)** **Ears on the roof (c)**

Plate 3. Some methods of conservation of the seeds of the *H. cannabinus* by the producers Mossi and Gurunsi

(for farming during the following rainy season, for sale, exchange, etc.). Seeds are kept in the state seeds by 53.6% of the producers in plastic sachets, bottles, cans and of the canaries in mixture with the ash or leaves of "*neem*" or in state of "spikes" practiced by 46.4% of the producers. The spikes are gathered, attached and hung either to a tree (5.7% of the producers), to the attic (6.8% of the producers) to a hangar (11.5% of the producers) or set down on the roof of the house (22.4% of the producers) (Plate 3).

4. DISCUSSION

The results of the ethnobotanical investigation reveal that *Hibiscus cannabinus* is well known and exploited in Burkina Faso, shown by the diversity of its usage and its local names. Indeed, we observed a variation of generic names according to the ethnic groups, and this was based on the morphological characteristics. In Burkina Faso, the identification of cultivars basing on the morphological features has been already evoked by Jiro et al., Bationo-Kando et

al., Sawadogo et al. [11,12,13]. This could be explained by the rural selection mode essentially based on phenotypical characters generally visible and easy to observe. According to Missihoun et al. [14], the local name is the essential element used by the producers in the management and the selection of the genetic resources. Thus, the knowledge of the rural nomenclature and the traditional system of classification of the varieties enable an understanding of the dynamics of their diversity. However, we notice a net regression of *Hibiscus cannabinus* grown in Burkina Faso, as shown by the number of farming zones and the reduced number and varying number of producers per province (4 to 29). This reduction could be linked to the use of improved varieties of the exotic vegetables. Nevertheless, despite the climate variabilities and change, the diseases and the pests, these improved varieties have a better agronomic behavior for the producers. Especially in the Sahel zone which is less water than the others, the producers receive seeds toward partners of food aids in the zone. Thus the disappearance of local species in these zones. Especially about *Hibiscus cannabinus*, its importance in our traditional societies is ended nowadays. Indeed, the fibers were used for the construction of the roofs of the huts, the stringing and in traditional rituals. To Mossis' the fibers were used for example for traditional clothes "*biiddu*". They were also used to prepare the cadaver for the funeral rituals and should come necessarily from the nuclear family. This encourages these people to produce the plant. Nowadays, the huts are replaced progressively by more modern buildings; the strings of fibers by string of wool or of nylon and plastic. The cadavers are buried with coffins and the revealed religions oppose some traditional rituals. The growing is only practiced by two ethnic groups: Mossi and Gurunsi mainly. This could be due to sociocultural reasons. Indeed, the local dish called in mooré *"Bagbenda"*, or "*Zintoko"*, and in gurunsi "*kanzaga*" cooked with fresh leaves of *H. cannabinus*, Caya blanc, sorrel or amaranth, is a sauce of a highly cultural identity at some ethnic groups, Mossi and Gurunsi [15]. The same, seeds of *H. cannabinus* are manufactured into "*soumbala"* very appreciate to Gurunsi-Lélé and Mossis'.

The results revealed that the mode of obtaining the seeds of *Hibiscus cannabinus* remains the same among all the other cultures in Burkina: the massale selection, the exchanges between producers, through the purchase and the gift [12,16,17]. There is no organization of local variety seeds provision in Burkina. Thus the usual unavailability of seeds every year. Unfortunately, this situation worsens every year because of the unsuitable method of seed conservation. According to Eteka et al. [18], the choice of seeds conservation mode is guided by the type and the quantity of seeds. So the methods used are essential, the storage of the seeds in canaries, attics, cans, bottles, plastic sachets or the exhibition of the spike on the roofs of the houses, on trees, under hangars etc. These methods showed their limits because the seeds are often attacked by bugs borers or the spontaneous corn-shelling of the spike, which cause the enormous losing of seeds. Besides *Hibiscus cannabinus* is essentially produced in mixed culture during rainy season often acting as reducing wind pressure to protect the other cultures. In the big urban centers, it is practically inexistent and even unknown.

5. CONCLUSION

The study revealed that *Hibiscus cannabinus* is always grown in rural zones but it is in net decline to the detriment of exotic vegetables. In these rural zones, the leaves and the seeds are much consumed. Indeed, the use of the fibers in the stringing and the construction of the roofs of hut is practiced by a minority in Mossi and Gurunsis zones. The study even revealed diversity of mode of seeds production based on the direct withdrawal in the spontaneous and cultivated ecotype, the exchanges between parents and friends, the purchase to the market and the massale selection. The survey of the farmer' nomenclature of the local varieties shown that peasants use morphological features in the classification of the local varieties. These last exploit mostly the green local varieties, to long cycle and to large size that give an important foliar mass. Such information can be taken in account in the next works of local varieties improvement.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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