doi: 10.7251/ZSAN2302457D **Professional paper**

TRADITIONAL USE OF HEMP (*Cannabis sativa* L.) IN THE BALKANS

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Abstract: *Cannabis sativa L. is one of the most versatile plants, and has been used by humans for thousands of years for its medicinal properties, strong fiber, nutritious seeds, and psychoactive resin. Despite the fact that cannabis has extremely versatile uses, currently most studies research only the chemical composition of the secondary metabolites of female cannabis inflorescences and their medicinal properties. The main goal of our research was to analyse the available data on the traditional use of cannabis in the Balkan Peninsula in the past. We further wanted to check whether connections between certain plant parts and therir uses exist, and if so, to what extent they are connected. Literature was collected from online databases (Scopus, Google Scholar, Cobiss) and digital libraries. Our search resulted in 24 publications that met our criteria. The majority of publications was found for Croatia, and the least for Kosovo and Slovenia. The analysis showed that the traditional use of cannabis varies between individual countries. According to our review, most common traditional uses of cannabis in the Balkan Peninsula were for fiber production, medicinal purposes, and food. We found very few data for psychoactive purposes. The results showed that the most frequently used parts of the plant are seeds, stems and fibers, while other plant parts such as leaves, inflorescences, and roots, were scarcely used. All collected data on the traditional use of cannabis in the Balkan Peninsula will be included in the CANNUSE-database of traditional Cannabis uses (http://cannusedb.csic.es) and thus accessible to the general public.*

Keywords: *Cannabis sativa L., hemp, ethnobotany, traditional use, Balkan*

Introduction

Cannabis sativa L. (hereafter referred to as cannabis) has been utilized in various cultures worldwide for centuries. Its traditional uses include medicinal purposes, production of fibers, ropes, textiles, and paper. It also served as a valuable source of food and played a significant role in many shamanic rituals due to its psychoactive substances. Today, its medical use and its effectiveness in many diseases has been confirmed by many studies. Its uses have also been extended to various other industries including textile, food, automotive, and cosmetic industry[1]. Many of these uses were also present in the countries of the Balkan Peninsula. People mostly planted cannabis for the production fiber for making clothes, ropes,

tablecloths and rags from, however, with the arrival of new materials and the industrialisation of society, these uses disappeared, and the customs mostly remained unknown to the new generations[2].

To this end, data collection on the traditional use of cannabis in the Balkan Peninsula was carried out to supplement the CANNUSE database, which represents an organized source of data for all scientists and general public interested in the various uses of cannabis (http://cannusedb.csic.es). The data was analysed to check whether there are connections between certain plant parts and their uses and, if so, to what extent they are connected.

Material and methods

Data collection

The literature was collected from online databases: Google Scholar, Scopus, COBIS as well as from digital libraries of individual museums and libraries in Croatia, Serbia and Bosnia and Herzegovina using the following set of keywords and exact terms: "*cannabis* AND ("Bosnia and Herzegovina" OR "Serbia" OR "Bulgaria" OR "Romania" OR "Slovenia" OR "Croatia" OR "Montenegro" OR "Albania" OR "North Macedonia"). Keywords such as "*cannabis* AND ("ethnobotany" OR "traditional knowledge") in English and "hemp AND ("Bosnia and Herzegovina" OR "Serbia" OR "Bulgaria" OR "Romania" OR "Slovenia") were also used in Serbian. The majority of results was obtained from the Google Scholar database. The largest number of results were BSc or MSc theses and review articles. Publications were only used when they met the following criteria:

- if the study area was situated on the Balkan Peninsula

- if the methods used were verified interviews and previous publications (old books, monographs, medical records, writings)

Data obtained from publications fitting these criteria were included in the Excel database table.

CANNUSE database structure and data organization

The database contains five categories according to the purpose of use: **medicinal** (which also includes veterinary use), food or **alimentary**, **fiber**, **psychoactive** and **other uses** in which we classified **cosmetic, magicoreligious** and **miscellaneous uses**. Two other categories, toxic use - **toxicity** and a category for the vernacular name - **vernacular name** were also filled out.

For each publication the following information was recorded:

- type and year of publication,
- country,
- region,

- taxon,
- vernacular name,
- part of the plant that was used (inflorescence, leaf, whole plant, seed, aerial part, stem, bark, root, twig and branch and other parts) or
- plant product used (resin, fiber and other products),
- use categories: medical, alimentary, fiber, psychoactive or other,
- animal or human use,
- if the plant was considered toxic or noxious
- modes of preparation and administration, whenever they were provided by the authors
- mix, i.e., "mixture" is a special form of category that was filled if, in addition to cannabis, another substance was used as an additive (of plant or animal origin)
- additional information was added whenever we found some interesting information that did not fit in previous columns.

Data analysis

The data was analyzed to obtain a general overview of the most common cannabis uses and their diversity. We gathered 24 data entries and analyzed them using Pearson's chi-square test of independence and Fisher's exact test to calculate p-values in XLSTAT 2020.3 (Addinsoft, New York, USA). With these methods, we investigated the relationship between plant parts and their use, such as fiber, alimentary, medicinal and other purposes. Because of low frequencies, we grouped reports for whole plant and aerial plant parts, stem and fiber. No records of other plants part uses were found.

Results and discussion

Our analysis included 24 publications. The majority of publications available online were found for Croatia, and the least for Kosovo and Slovenia. The results showed that different countries used this plant in different ways and called it by different vernacular or folk names. In Serbia, Slovenia and Bosnia and Herzegovina people call cannabis “konoplja” or “uzgojena konoplja”, while in Croatia it is also “pređa” or “industrijska konoplja”. In Bulgaria it is called “konop”, “oblikoven konop” or “konopeni grasti”, while in Romania it is named “cânepă” and in Kosovo “barqja”. Only in Slovenia and Croatia was cannabis used for animal purposes (3), while people in the rest of the Balkan countries used it only for human needs. Our main goal was to examine whether there are connections between certain plant parts and their use and, if so, to what extent they are connected. The results of the statistical analysis showed that of all plant parts, seeds, stems and fiber were used the most, while leaves, inflorescences, roots, bark, resin and other parts were used to a lesser extent (Table 1). In the Balkans, cannabis is mostly used for fiber production, followed by medical purposes and food use. For these purposes, most used parts of the plant were seeds, stems and fibre or the whole plant and aerial plant parts. We found several uses for magical or religious purposes but found only a few reports for

psychoactive uses (Table 1). All the results obtained in our analysis have been graphically presented in Figure 1.

Table 1: Number of reports of each plant part per use category

Type of use	L	WP+AP	SE	ST+F	OPP	SUM
Medicinal use	6	3	16	0	0	25
Alimentary use	0	0	11	0	0	11
Fiber use	0	4	1	25	0	30
Psychoactive use	0	1	0	0	0	1
Other uses	1	0	8	1	0	10
SUM	7	8	36	26	0	77

Plant parts: L- Leaf, WP- Whole plant, AP- Aerial part, SE- Seed, ST- stem, F- Fiber, OPP - Other plant parts and products (inflorescences, bark, root, resin, shoot, twig and branch and other plant parts and products). In "other uses" we included 3 categories: magicoreligious, cosmetic, and miscellaneous uses.

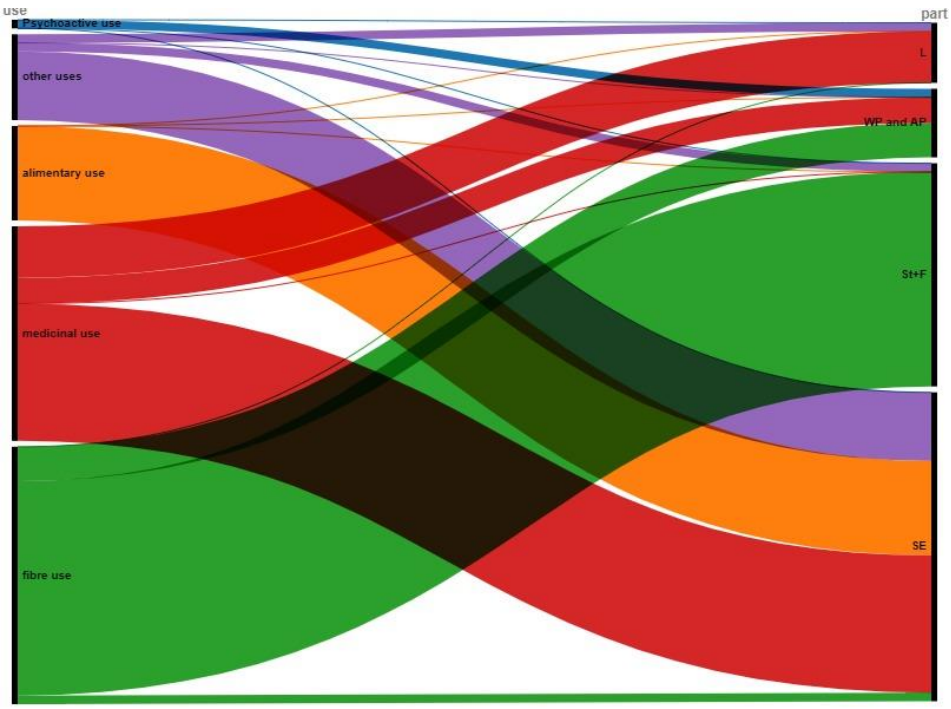

Figure 1: Different cannabis uses and corresponding the plant parts used. Fiber use was the most common (39 %), and stems and fibers represent most of the plant parts used for this purpose. Following were medicinal (33 %), alimentary (14 %) and other uses (13 %) where use of seeds prevailed.

It is interesting that all countries, with the exception of Kosovo, have documented instances of seed use. All but Kosovo and Slovenia also used the stem. Leaf use was recorded for Bosnia and Herzegovina, Croatia, Serbia and Slovenia,

while fiber use was recorded mostly in Bulgaria, Croatia, Romania and Serbia. Slovenia and Croatia were the only two for which we recorded the use of the whole plant, while only in Kosovo and Slovenia aerial parts of the plant were used (Table 2).

Table 2: Total number of reports for each plant part per use category.

Country	L	WP+AP	SE	ST+F	OPP
Bosnia and Herzegovina	2	0	2	3	0
Bulgaria	0	0	5	8	0
Croatia	3	3	11	12	0
Kosovo	0	2	0	0	0
Romania	0	0	2	8	0
Serbia	1	0	2	8	0
Slovenia	2	5	7	0	0
Grand Total	8	10	29	39	0

Plant parts: L- Leaf, WP- Whole plant, AP- Aerial part, SE- Seed, ST- stem, F- Fiber, OPP - Other plant parts and products (inflorescences, bark, root, resin, shoot, twig and branch and other plant parts and products). In "other uses" we included 3 categories: magicoreligious, cosmetic, and miscellaneous uses.

The results of Pearson's chi- square test show, that there is a non-random association between cannabis use categories and plant parts used ($X^2 = 79.348$; df = 12; $p < 0.0001$). Table 3 shows adjusted residuals of Pearson's chi-square test and p values calculated with Fisher's Exact test for different plant parts for each of the use categories. Leaf was positively associated with medicinal use ($p < 0.05$), seed with alimentary use ($p < 0.0001$) and stem and fiber for fiber use ($p < 0.0001$) (Table 3). Based on this, we conclude that not all parts of the plant were equally used for all purposes.

Table 3: Adjusted residuals of Pearson's chi- square test in bold indicate the existence of high correlation between these plant parts and the use category. Significant positive association between use categories and plant part calculated with Fisher's Exact test is indicated with asterisks (* $p < 0.05$ and ** $p < 0.0001$).

Type of use	L	WP+AP	SE	ST+F
Medicinal use	**3.155***	0.321	**2.103**	**-<0,0001**
Alimentary use	-<0,0001	-<0,0001	**3.823****	**-<0,0001**
Fiber use	**-<0,0001**	0.676	**-<0,0001**	**7.348****
Psychoactive use	-<0,0001	**2.956**	-<0,0001	-<0,0001
Other uses	0.107	-<0,0001	**2.259***	-<0,0001

Plant parts: L- Leaf, WP- Whole plant, AP- Aerial part, SE- Seed, ST- stem, F- Fiber, OPP - Other plant parts and products (inflorescences, bark, root, resin, shoot, twig and branch and other plant parts and products). In "other uses" we included 3 categories: magicoreligious, cosmetic, and miscellaneous uses.

Medicinal use

We recorded the greatest use for medical purposes in Croatia, where cannabis leaves were mostly used as antiparasitic, for bites or stings, or for heart problems [4]. However, we also recorded the treatment of other health problems using cannabis seeds. They were used as an anti-diabetic and antihypertensive[5], for treating headaches, fever, [4], diabetes, high pressure or improvement of the immune system[5]. For Bosnia and Herzegovina, we also recorded the use of plant leaves for jaundice and eczematous treatment[6]. In Bulgaria, macerated seeds were used for pain and inflammation [7], and in Romania seeds were used for skin and subcutaneous tissue disorders as skin infections and impetigo (skin disease) [8]. Other countries employed other plant parts to address various health conditions. Due to the limited amount of data available, it was not possible to conduct a statistical analysis on them.

Alimentary use

The results of Pearson's chi-square and Fisher's exact test show us a high correlation of seed use with alimentary use (Table 3), based on which we conclude that the seeds of this plant were mostly used as food and in drink preparations for both human and animal needs. We recorded the widest use of seeds in the territory of Slovenia, where seeds were mostly used for feeding animals by making flour for animals or as food for birds [3]. In Croatia, cannabis was used in the form of tea, flour and oil [9], and even as a special type of dish called ‘fritaja’, which is scrambled eggs mixed with young shoots of the *Ruscus aculeatus* plant [5]. In Bulgaria, they used cannabis seeds in their diet as boiled cereals [10].

Fiber use

As expected, the results indicate the highest correlation between the use of stems and plant fibers for production of fiber. In general, cannabis use in the Balkans throughout history is mostly recorded for the fiber production. Records of widespread fiber use were found from almost all countries in the Balkan peninsula. We divided the use of fibers into three categories depending on the type of product obtained: production of textiles, production of ropes, and other uses. For the most part, the existence of textile production is recorded, because cannabis fibers were used to make different parts of clothing, such as T-shirts [11], skirts [12], men's and women's underwear [13] [14], women's headscarves [15], all of which represented parts of the folk costume that they wore on a daily basis [16]. In addition to traditional costumes, cannabis fibers were also used to make tablecloths [12], bed linen [17], towels [18], tea towels, baby diapers [19] and other fabric in general [6]. Cannabis was also used to make quality ropes [20] and cords [3]. In the category of other uses, we have included the production of canvas for sailboats, paper and school textbooks [3], sacks, belts [3], twine, mats [21], the production of mattresses [16] and knitwear [2]. All the results indicate that the countries of the Balkan peninsula used cannabis mostly for the manufacture and production of fibers. The manufacturing process itself was an integral part of the life of the people in the countryside, which often represented

events for the gathering of all the peasants, and the manufacturing process itself was mostly done by women.

Psychoactive and other uses

We recorded only one record of psychoactive use in Slovenia, where it was used to stun [3]. A single cosmetic use (production of soap from seed) was also recorded from Slovenia [3]. We also found different uses of cannabis for magical and ritual purposes. Most of them from the territory of Serbia and Slovenia, where were used for defense against evil spirits, protection of newborns [22] and people from evil [23].

Conclusion

In this study, we collected data that indicate a different picture of the use of cannabis compared to other countries in the world found by Balant et al. [24]. However, it is important to emphasize that we only used sources available to us online. Because of the topic itself, it is expected that more information on the ethnobotanical use of cannabis could be found in books and old writings or recipes of folk medicine, which will require further research. Therefore, the results obtained here give us a first approximation of the diversity of cannabis uses in the Balkans in the past. Further research of all sources and publications (not only the ones available online) is therefore needed to get a complete and detailed insight into the use of cannabis in the Balkan peninsula.

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