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Review article

CONTROVERSIAL TAXONOMY OF HEMP

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Hemp (*Cannabis sativa* L.) was one of the earliest domesticated plant species. Biological classification (taxonomy or systematization) manifests evolutional relationships between taxons according to trait similarities. When it comes to taxonomy, hemp is one of the most controversial plant species due to significant effects of environmental conditions on hemp phenology and expression of quantitative traits as well as different levels of gender expression observed in hemp plants. Controversial taxonomy of hemp has gone through several phases throughout history. The attitude on the number of species within the genus *Cannabis* and the criteria used in taxonomic units division were under dispute. Initially focused on morphological characteristics and geographical origin, the approach was greatly amended by the development of molecular and biochemical techniques. The main cause of taxonomic uncertainties is the inbreeding ability of all wild *Cannabis* populations, resulting in continual variability of quantitative traits. The aim of the paper is to review the history of *Cannabis* classification including different approaches to this scientific issue.

Keywords: cannabinoids, *Cannabis* taxonomy, genus evaluation, hemp

INTRODUCTION

Hemp (*Cannabis sativa* L.) was one of the earliest domesticated plant species, and it had long been considered one of the most significant crops (BERENJI and SIKORA, 2001). The putative center of origin of the genus *Cannabis* is Central Asia from where it may have been expanded to East and South Asia and westward to Europe by human activity (CLARKE and MERLIN, 2013). Throughout the world, wild hemp populations are adapted to specific climatic conditions of different environments, or hemp is cultivated as a source of high-quality fibers

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(BERENJI *et al*., 1995), multipurpose oils, seed proteins (BERENJI *et al*., 2001), and *Cannabis sativa* herba (flowers and leaves) which has specific chemical content.

Biological classification (taxonomy or systematization) manifests evolutional relationships between taxons according to trait similarities. When it comes to taxonomy, hemp is one of the most controversial plant species due to significant effects of environmental conditions on hemp phenology and expression of quantitative traits (SIKORA *et al*., 2011a) as well as different levels of gender expression observed in hemp plants (STOJANOVIĆ *et al*., 2016). The main cause of taxonomic uncertainties is the inbreeding ability of all wild *Cannabis* populations, resulting in continual variability of quantitative traits (ANDERSON and DE VINCENTE, 2010).

The aim of the paper is to review the history of *Cannabis* classification including different approaches to this scientific issue.

FAMILY *CANNABACEAE*

ENDLICHER (1837) defined a specific family *Cannabaceae* within the *Urticales* genus, which has been referred to as *Cannabinaceae* or *Cannabiaceae* in botanical literature (MILLER, 1970). Genera *Cannabis* (hemp) and *Humulus* (hop) were traditionally included within the family *Cannabaceae*. Although hemp and hop differ significantly in terms of their plant habitus (hop plant is a spiraling vine, while hemp has an upright and relatively firm stalk), there are also significant similarities between these two plant species. Hemp and hop fruit is anachene, visually hard to distinguish in wild populations. Resin glands which produce specific terpene - micrene through similar biosynthesis are found in the above-ground plant parts of both these species (RAHARJO *et al*., 2004). Hemp and hop stalks have a significant content of strong fiber and they can be mutually grafted (CROMBIE and CROMBIE, 1975). Hemp and hop products have a sedative, antibiotic and antioxidative effect, and both species are used in pharmaceutical industry. Research of structural organization of nuclear ribosomal DNA (rDNA) has shown similarities between hemp and hop and supports their taxonomy (PILLAY and KENNY, 2006). The results of recent molecular research reveal that morphological diversification of these two genera based on their common ancestor began about 21 million years ago (YANG *et al*., 2013; DIVASHUK *et al*., 2014).

Hemp and hop were placed into other families besides *Cannabaceae* (THORNE, 1992) - mostly *Moraceae* (ENGLER and PRANTL, 1889; GREUTER *et al*., 1993; JUDD *et al*., 1994) or *Urticaceae* (HUMPHRIES and BLACKMORE, 1989) - by different botanical classifications throughout history.

According to contemporary molecular research (SYTSMA *et al*., 2002; YANG *et al*., 2013), *Cannabaceae* family includes 8 more genera besides hemp and hop: *Aphananthe*, *Gironniera*, *Lozanella*, *Celtis*, *Pteroceltis*, *Chaetachme*, *Trema*, and *Parasponia.*

GENUS *CANNABIS*

The first hemp description was given by Roman philosopher Pausanius in 2nd century BC. In his work *De Materia Medica* (3:165), Greek botanist Pedacius Dioscorides described the medical value of the plant which he called *Kannabis* (NELSON, 1996). Although Linnaeus is considered to be the first to use the name *Cannabis sativa*, it had been used before by Fuchs in *Kreuterbuch* from 1543 (FUCHS, 2002).

The beginning of a systematic approach to hemp classification dates back to 18th century, when Linnaeus (1753) described several varieties in his comprehensive work *Species Plantarum.* Most were placed in the genus *Cannabis* while one was named *Cannabis sativa*. Besides *Cannabis sativa*, described as a relatively tall plant with a fibrous stalk, LAMARCK (1785) mentions *Cannabis indica* as a shorter phychoactive plant. The term "*indica*" refers to its origin and basically means that plants of this taxon originate from India. Until the beginning of 19th century, the term *Cannabis indica* was used to designate pharmaceutical hemp imported from India which was used in popular medicine. Polytypic approach to hemp classification, which recognizes two species of the genus *Cannabis* (*Cannabis sativa* L. and *Cannabis indica* LAM.) had prevailed until early 19th century, when LINDLEY (1838) placed only *C. sativa* in the genus *Cannabis*.

DE CANDOLLE (1869) took a specific approach to hemp taxonomy by acknowledging one species *C. sativa* with 4 groups: α Kif, β Vulgaris, γ Pedemontana and δ Chinensis. The group has a lower rank order stability with consistent trait inheritance, although significant variation occurs within the group due to environmental effects. According to this taxonomy, group α is clearly defined as southern hemp with strong phychoactive effects. Groups γ and δ are defined as northern hemp varieties used for fiber production, whereas group β includes intermediate varieties with characteristics of all the groups.

VAVILOV (1922) included *Cannabis sativa* var. *spontanea*, wild dioecious hemp from North Caucasus, Ural, Volga region, Altai, and Central Asia, into hemp systematization.

The third species of the genus *Cannabis* - *Cannabis ruderalis* described by JANISHEVSKY (1924) referred to weeds which grew spontaneously outside the cultivated plots. Seed characteristics of *Cannabis ruderalis* are the same as those of Vavilov's *Cannabis sativa* var. *spontanea*, from which it is distinguished by slower plant growth and branching.

Within the species *Cannabis indica*, VAVILOV and BUKINICH (1929) distinguished a subspecies from Afganistan and named it *Cannabis indica* ssp. *afganistanica*, which refers to hemp from Afganistan, Pakistan, Iran, Turkey, Syria, parts of India and North Africa, regardless of whether it is grown for production of fiber, seed or drug production. It differs from Lamarck's *Cannabis indica* in its phenotype, leaf shape and inflorescence morphology.

Having defined three species of the genus *Cannabis*, VAVILOV (1931) formulated a thesis, claiming that *Cannabis sativa* L. and *Cannabis indica* LAM. originated from *Cannabis ruderalis* JANISH.

One of the most detailed hemp taxonomies was provided by SEREBRIAKOVA (1940), who separated the genus *Cannabis* into two species based on their morphological characteristics. It deserves special attention as one of the most detailed hemp classifications so far. *Cannabis sativa* L. includes tall, poorly-branched plants with large leaves and large grey-brown coloured grain. *Cannabis indica* LAM includes short, abundantly branched plants with small leaves and small, shiny, dark-coloured grain. *Cannabis sativa* was further divided into two subspecies: *Cannabis sativa* ssp. *spontanea*, wild hemp morphologically similar to *Cannabis ruderalis* JANISH which had already been previously included, and *Cannabis sativa* ssp. *culta* which includes forms grown for fiber and grain. Cultivated hemp has an even more detailed classification which divides species into geographic races or ecotypes (*proles*) each with

different varieties and forms, amounting to 31 taxons in the overall hemp systematization (Table 1).

Table 1. Genus Cannabis taxonomy according to Serebriakova (1940).

Species	Subspecies	Proles	Variety	Forma
C. sativa	*culta*	*australis*	italica	
			caucasica	
			maritime	
			cubensis	
			americana	
			orientalis	
			japanicus	
		medioruthenica	austroucrainica	
			vulgaris	oleifera
				textilis
		borealis	sibirica	
			praecox	jacutensis
		asiatica	subnarcotica	
			narcotica	flavoviridis
	spontanea	*subspontanea*	intermedia	
		euspontanea	ramosa	prostrata
			microphylla	
C. indica				

Southern cannabis (*Cannabis australis* SEREBR.) is situated in Central, Southeast and Southern Europe. Fiber hemp with higher yields compared to Central Russian hemp is grown in England, Netherlands and Northern Germany. Seed production is possible below 50th parallel north, due to poor seed maturation above this latitude. This group includes economically most significant varieties which are designated according to their country of origin: Hungarian, Romanian, Italian, Spanish, Turkish, and South-Russian hemp. Their main traits are a relatively long maturity period of 130-150 days; stalk height between 2.5-4.5 metres, with a tendency to branch if larger plant spacing is applied; large leaves with 9-11 folioles; high stem yield and high bast fibre content; medium seed yields much lower compared to Central Russian hemp.

Central Russian hemp (*Cannabis medioruthenica* SEREBR.) grows at the latitude between 50th and 60th parallel north, mainly in Russia, Ukraine, Poland, Scandinavia, and Northern Germany. Its most important traits are 90-100 day maturity period; 1.25-3.0 metre tall plants; poor branching; medium-sized leaves with 5-9 folioles, as compared to other geographic races, with medium bast fibre content and very high seed yield.

Northern hemp (*Cannabis borealis* SEREBR.) includes Russian and Finnish hemp varieties grown above 60th parallel north, with a very short stalk below 1.5 metres in height. It matures earlier than Central Russian hemp, while otherwise the two are very similar. This group

is composed of economically least significant varieties with the shortest maturity period. Nevertheless, it occupies significant surfaces in Northern Europe as the only fiber and oil crop.

Asian hemp (*Cannabis asiatica* SEREBR.) contains hemp varieties grown in China, Japan, Thailand, and Korea. Stalk reaches 2.5-3.0 metres with many shorter parts and the highest branching tendency among all geographic groups. Large, intense-green coloured leaves, with 9-13 folioles. Certain varieties within this group significantly differ in terms of their vegetation period, which lasts 150-170 days on average. Asian hemp has no economic significance in Europe, where it is only grown illegally for the purpose of drug production. Its botanical classification is unclear since it can be defined as Indian (*Cannabis indica*) or Asian hemp (*Cannabis sativa* ssp. *culta* prol. *asiatica*). Fiber hemp is used as raw material in textile industry, industrial hemp for paper production, while oilseed hemp is grown for the production of certified seed.

Wild hemp (*Cannabis sativa* ssp. *spontanea*) grows in Central Asia, some regions of Russia (Volga and Ural) and southern Europe. Plants are very short (up to 1m) and abundantly branched, with small seeds. It is possible for wild hemp to flower simultaneously with cultivated hemp since both interbreed easily, and the result can be biological degradation of the cultivated variety. Besides the direct damage it can cause, wild hemp is undesired in plant production as it can be host to parasitic broomrape *Orobanche ramosa* and dodder *Cuscuta europaea.* Varieties with longer stalks that occur spontaneously throughout Europe are not wild hemp but rather cultivated plants growing wild. Feral hemp grows spontaneously along roads, canals or furrows. Wild hemp and feral hemp are neither systematically nor morphologically identical.

ZHUKOVSKI (1950) recognized two species as the basis for *Cannabis* classification. According to this author, *Cannabis ruderalis* JANISH is a specific weed, widely dispersed throughout Northern Siberia, Central Asia, the Volga basin and Europe. The other species - *Cannabis sativa* L. - grows wild in river basins and on slopes in the Transvolga and islands of the Volga Delta, as well as in the Himalaya, Hindu Kush, Tian Shan, and Altai Mountains.
Based on field experiments and studies of other authors, SCHULTES *et al*. (1974) and EMBODEN (1974) accepted the theory which proposes three species of *Cannabis*: *Cannabis sativa* L., *Cannabis indica* LAM and *Cannabis ruderalis* JANISH.

Hemp taxonomies introduced by the end of XX century were as logical as available material and information allowed, and they were not in mutual contradiction. Since limited germplasm was used for taxonomy establishment in the studies, a comprehensive overview of variability within *Cannabis* gene pool could not have been obtained. Morphological traits and/or geographical origin were the most important criteria used in systematization of certain taxons. The main difference between the theories is in the number of species clearly defined within the genus *Cannabis*.

BIOCHEMICAL AND MOLECULAR APPROACH TO HEMP TAXONOMY

A new approach to hemp taxonomy occurred at the beginning of XXI century. The studies of HILLIG (2004a, 2004b, 2005a, 2005b) and HILLIG and MAHLBERG (2004) opt for the chemotaxonomic approach or chemotaxonomic classification based on variability of the secondary metabollites. Considering the theory according to which *Cannabis* includes three species, based on testing samples of different geographical origin, the authors came to the

conclusion that the whole germplasm should be divided into three main and several taxonomically different, lower rank biotypes.

Cannabis ruderalis or the putative ancestor (PA) of the cultivated hemp is considered as a wild primitive biotype, which was not purpose fully modified in the process of human-controlled selection. Although it might have been a valid taxon in the past, it is supposed that *C. ruderalis* did not preserve its genetic integrity due to easy gene transmission from the cultivated plants (CLARKE and MERLIN, 2013) considering that completely spatially isolated populations cannot be found in natural environments.

According to HILLIG (2005a), *Cannabis sativa* includes two subspecies or biotypes: *C. sativa* ssp. *sativa* or the narrow leaf hemp (NLH) representing European industrial hemp cultivars obtained in the long-term selection of hemp cultivated for fiber and seed production. *C. sativa* ssp. *spontanea* or narrow leaf hemp ancestor (NLHA) includes spontaneous populations from Eastern Europe and west Asia. These populations most likely originate from cultivated hemp varieties which, at some point, escaped cultivation and developed under the conditions of natural selection (POLLIO, 2016). These hemp populations are called self-seeding or spontaneous, although hemp populations which sporadically occur in cultivation are often referred to as "wild hemp" (BERENJI and SIKORA, 2011).

According to the classification of HILLIG (2005a), *Cannabis indica* is divided into four subspecies or biotypes. *C. indica* ssp. *indica* cultivated narrow leaf hemp varieties with expressed psychoactive effects (narrow leaf drug NLD) from the Indian subcontinent. *C. indica* ssp. *kafiristanica* or narrow leaf drug ancestor (NLDA) includes spontaneous populations from Nepal and North India. This biotype could represent a hemp NLD ancestor, but it is more probably a self-seeding hemp which escaped cultivation of NLD varieties. *C. indica* ssp. *afghanica* contains broad leaf drugs (BLD) from Afganistan or West Turkestan characterized by short stalk and wide, dark-green leaves. *C. indica* ssp. *chinensis* contains broad leaf hemps (BLH) traditionally grown for the purpose of fiber and seed production in East Asia.

Another modern approach to hemp taxonomy is classification based on DNA sequence variation (GILMORE *et al*., 2007). PCR application using populations of different origin and purpose resulted in establishment of six closely connected and mutually inherited gene sets or haplotypes, which can be divided into three groups.

Group A is composed of haplotypes I and II. Haplotype I contains all the cultivated and wild haplotypes in Europe and north America which are identical to Hillig's NLH or NLHA biotypes. Haplotype II includes fiber hemp from the Korean peninsula.

Group B is composed of wild and cultivated hemp varieties with psychoactive potency. Haplotype III originates from Afganistan (BLD), Mexico, Nepal and Turkey (NLD). Haplotype IV is BLH originating from China. Although it is traditionally grown for fiber and seed production, it has genetic potential for increased THC content.

Group C includes NLD biotypes (*C. indica* ssp. *indica*) placed into haplotypes V and VI originating from Africa, India, Jamaica, Mexico, Nepal, Holland and Thailand.

Metabolic classification based on biochemical markers could be used to explain the differing *Cannabis* taxa, and it is the pivotal subject of contemporary research (HAZEKAMP *et al*., 2016) expected to contribute to obtaining more precise definitions in further studies. Molecular genetics techniques were applied in several other studies focused on mapping of hemp

germplasm but they did not offer a more detailed taxonomy. FAETI *et al*. (1996) applied RAPD analysis, while CARBONI *et al*. (2000) and FORAPANI *et al*. (2001) used RFLP molecular markers in industrial hemp assortment analysis. GILMORE *et al*. (2003) applied microsatellites in determining the degree of genetic diversity, DATWYLER and WEIBLEN (2006) assessed genetic variation by AFLP molecular markers, HAKKI *et al*. (2007) applied ISSR, while PINRAKARA *et al*. (2009) used RAPD to distinguish industrial from psychoactive hemp for forensic purposes.

In support of Hillig's taxonomy, all genetic studies emphasize the divergence of biosynthetic paths which result in the distinction of *C. indica* (NLDA, NLD, BLD and BLH) and industrial *C. sativa* (NLH and NLHA).

PRACTICAL APPROACH TO HEMP TAXONOMY

Several researchers have recently contributed to a practical approach to hemp taxonomy based on different taxonomic concepts (SMALL and CRONQUIST, 1976; HILLIG 2004a; 2005a; MCPORTLAND and GUY, 2004; MCPORTLAND, 2018; CLARKE and MERLIN, 2013). These concepts and taxonomies were compared by SMALL (2017) in Table 2.

Table 2. A comparison of taxonomic concepts and terminology for Cannabis groupings

Small and Cronquist (1976)	Hillig (2004a, 2005a)	McPartland and Guy (2004)	Clarke and Merlin (2013)
Domesticated *Cannabis*			
C. sativa ssp. *sativa* var. *sativa*	*C. sativa* hemp biotype	*C. sativa* ssp. *sativa*	*C. sativa* ssp. *sativa*
	C. indica hemp biotype	*C. indica* ssp. *chinensis*	*C. indica* ssp. *chinensis* (BLH)
C. sativa ssp. *indica* var. *indica*	*C. indica* narrow-leaflet drug biotype	*C. indica* ssp. *indica*	*C. indica* ssp. *indica* (NLD)
	C. indica wide-leaflet drug biotype	*C. indica* ssp.*afghanica*	*C. indica* ssp.*afghanica* (BLD)
Uncultivated *Cannabis*			
C. sativa ssp. *sativa* var. *spontanea*	*C. sativa* feral biotype	*C. sativa* ssp. *spontanea* + *C. ruderalis*	*C. sativa* ssp. *spontanea* (NLHA)
C. sativa ssp. *indica* var. *kafiristanica*	*C. ruderalis* + *C. indica* feral biotype	*C. indica* ssp. *kafiristanica*	*C. indica* ssp. *kafiristanica* (NLDA)

One of the main bases of taxonomy is plant exploitation manner, or breeding for high THC-content in flower and high fiber content in stalk. Seed characteristics were used for discrimination of cultivated and wild hemp. Unlike cultivated varieties, wild populations have

smaller, easily-shattered seeds. Combined, these criteria served as the basis for graphic presentation of hemp gene pool classification by SMALL and CRONQUIST (1976), as shown in Figure 1.

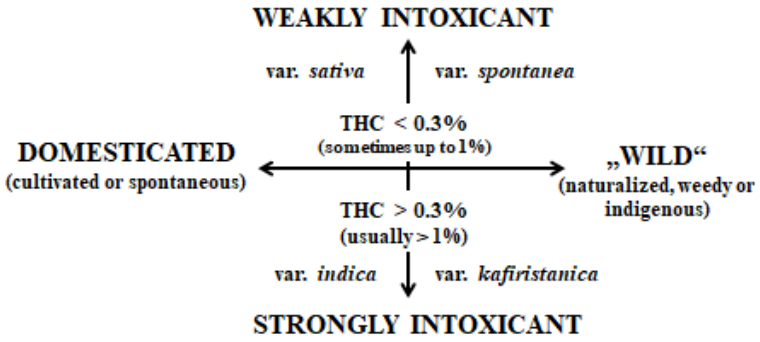

Fig. 1. Classification of *Cannabis sativa*, illustrating conceptual bases of delimitation (SMALL and CRONQUIST, 1976; with modification).

Considering the suspected origin of domestication and psychoactive potency as the main criteria of classification based on ICN (International Code of Nomenclature for Algae, Fungi, and Plants) SMALL (2015) recognized several groups which deserve special taxonomic attention.

1. Hemp domesticated in West Asia and Europe for fiber and seed production with low THC and relatively high CBD;
2. Hemp domesticated in East Asia especially in China, with low or medium THC and high CBD;
3. Marijuana domesticated in the wide region of South and Central Asia with THC as dominant cannabinoid;
4. Marijuana domesticated in South Asia, above all Afganistan and surrounding countries with significant THC and CBD content;
5. Hybrids between two hemp groups (1 and 2);
6. Hybrids between two marijuana groups (3 and 4).

Hybrid groups (5 and 6) including populations of stabilized quantitative and qualitative traits with continual variability between hemp or marijuana biotypes. From the geographical aspect, domesticated types adapted to flowering in northern regions and grown for fiber share a

common set of traits linked to high yields of biomass and high fiber content in stalk (BERENJI *et al*., 2013). Domesticated types bred for increased psychoactive potency share a different set of traits, with low content of low-quality fiber in stalk and high THC content, physiologically adapted to lower latitudes of northern hemisphere.

CONCLUSION

Controversial taxonomy of hemp has gone through several phases throughout history. The attitude on the number of species within the genus *Cannabis* and the criteria used in taxonomic units division were under dispute. Initially focused on morphological characteristics and geographical origin, the approach was greatly amended by the development of molecular and biochemical techniques.

Similar to other wild plant species, hemp is found within the complex: cultivated plants-weeds (TÓTH *et al*., 2015), which is formed when cultivated forms escape cultivation naturally (through seed shattering) and grow spontaneously in natural environments. Due to specific breeding pressure, feral hemp develops significantly different traits compared to the traits of starting material as a way to expand quantitative trait variability. On the other hand, continual trait variability spontaneously occurs due to long-distance pollen dispersal by wind and easy inbreeding within the gene pool (SIKORA *et al*., 2011b).

Although polytypic approach (SHULTES *et al*., 1974) has not been completely dismissed, classification supporting one species of the genus *Cannabis* - *C. sativa* - is a natural state of *Cannabis* gene pool given the novel studies and continual quantitative trait variability in natural environments.

Key to subspecies and varieties of *Cannabis sativa* L. widely accepted among researchers was presented by SMALL and CRONQUIST (1976).

Cannabis sativa subsp. *Sativa* – Plants of limited psychoactive potency due to THC usually comprising less than 0.3 % (dry weight) of upper third of flowering plants, (sometimes up to 1 %), and usually less than half of cannabinoids of resin. Plants cultivated for fiber or oil or growing wild in regions where such cultivation has occurred.

C. sativa subsp. s*ativa* var. *sativa* – Mature achenes relatively large, seldom less than 3.8 mm long, tending to be persistent, without a basal constricted zone, not mottled or marbled, the perianth poorly adherent to the pericarp and frequently more or less sloughed off.

C. sativa subsp. *sativa* var. *spontanea* VAVILOV - Mature achenes relatively small, commonly less than 3.8 mm long, readily disarticulating from the pedicel, with a more or less definite, short, constricted zone toward the base, tending to be mottled or marbled in appearance because of irregular pigmented areas of the largely persistent and adnate perianth.

C. sativa subsp. *indica* (LAM.) SMALL & CRONQUIST - Plants of considerable intoxicant ability, delta-9 THC usually comprising more than 1 % (dry weight) of upper third of flowering plants, and frequently more than half of cannabinoids of resin. Plants cultivated for intoxicant properties or growing wild in regions where such cultivation has occurred.

C. sativa subsp. *indica* var. *indica* (LAM.) WEHMER - Mature achenes relatively large, seldom less than 3.8 mm long, tending to be persistent, without a basal constricted zone, not mottled or marbled, the perianth poorly adherent to the pericarp and frequently more or less sloughed off.

C. sativa subsp. *indica* var. *kafiristanica* (VAVILOV.) SMALL & CRONQUIST - Mature achenes relatively small, usually less than 3.8 mm long, readily disarticulating from the pedicel, with a more or less definite, short, constricted zone toward the base, tending to be mottled or marbled in appearance because of irregular pigmented areas of the largely persistent and adnate perianth.

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KONTROVERZE VEZANE ZA TAKSONOMIJU KONOPLJE

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Izvod

Biološka klasifikacija (taksonomija ili sistematika) se zasniva na definisanju hijerarhijske organizacije koja na osnovu procene sličnosti osobina efikasno odražava evolucione odnose između pojedinih taksona. Kada govorimo o sistematizaciji, konoplja je svakako jedna od najkontroverznijih biljnih vrsti. Osnovni problem prilikom definisanja pojedinih taksona na nivou vrste je sposobnost međusobnog ukrštanja svih formi u okviru roda Cannabis, čime se u prirodi dobija kontinualna varijabilnost kvantitativnih svojstava. Problematiku dodatno komplikuju i specifičnosti biljne vrste, odnosno značajan uticaj uslova spoljne sredine na fenologiju i ekspresiju kvantitativnih svojstava, kao i različiti nivoi ekspresije pola kod biljaka konoplje. Kontroverzna taksonomija konoplje je tokom istorije prolazila kroz razne faze. Diskusija se najviše vodila u pogledu zauzimanja stava o postojanju jedne ili više vrsti u okviru roda *Cannabis* a zatim i o kriterijumima korišćenim pri podeli na niže taksonomske jedinice. Razvojem molekularnih i biotehnoloških tehnika problematika je, u početku zasnovana isključivo na morfološkim karakteristikama i geografskom poreklu, u znatnoj meri dopunjena. Cilj rada je da se da istorijski pregled razvoja klasifikacije konoplje uz sagledavanje različitih pristupa tematici.

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