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ILLEGAL CANNABIS GROWERS IN SERBIA*

Original scientific paper

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ABSTRACT

The subject of this paper is the indoor cultivation of marijuana in laboratory conditions in Serbia. The sample included 138 illegal laboratories discovered in Serbia in the period from 1 January 2013 to 30 June 2019. In 51 (37%) of the laboratories discovered, marijuana was detected at various stages of the production process, from stems of very low height to the final product ready for distribution to the illegal drug market. This result points to the conclusion that the producers took care to have a certain amount of "the goods" ready for the illegal drug market at all times. In 136 laboratories discovered (for the two remaining laboratories there were no data available), the total of 196 persons were deprived of liberty, whose average age was 38 (+/- 10). Out of that number, only one person in each of the 96 (68.4%) laboratories discovered was arrested. The number of the arrested persons is very small, which leads us to a conclusion that the criminal investigations do not sufficiently determine the connection between the illegal producers and the rest of the criminal organization.
Key words: *cannabis, indoor cultivation, commercial growers, clandestine laboratories*

INTRODUCTION

Cannabis or hemp (Lat. *Cannabis sativa*) is one of the oldest plant crops with a multiple purpose. It is used as an industrial raw material, for medical purposes, but also as a drug. The presence of the psychoactive cannabinoid tetrahydrocannabinol (Δ9-THC) classifies this plant as a psychoactive substance. According to the Law on Psychoactive Controlled Substances of the Republic of Serbia, the possession, cultivation and trafficking of cannabis varieties containing more than .3% of substances from the tetrahydrocannabinol group is prohibited (Article 58). However, as hemp is a useful industrial raw material, it is important to determine the concentration and ratio of the main cannabinoids Δ9-THC and cannabidiol (CBD) and based on that to distinguish between industrial hemp and drug as a psychoactive substance (Koturevic & Brankovic, 2014), which is determined by appropriate expertise.

Marijuana, hashish and hash oil are three products made from the cannabis plant, which are on the list of narcotic drugs due to their psychoactive effect. One of the important differences between these psychoactive substances is in the concentration of THC. For example, marijuana contains the lowest percentage of THC - up to 5%, and when consumed it has the mildest effect, hashish contains 5 - 12%, and hash oil 15 - 70% THC (Gazdek, 2014). In the last 20 years, production processes, usually in laboratory conditions, have managed to increase the concentration of THC in marijuana, and its concentration can be 6% or even more. The percentage of THC in cannabis indica depends on the part of the plant which is used for drug production, but also on the characteristics of the plant itself, fertilizer type, processing method, the time of harvest and the geographical location where this plant grows (Otasevic, Atanasov, & Labovic, 2020).

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Canabis is an annual unisexual plant which is pollinated by wind in natural conditions. However, for the needs of indoor cultivation, the naturally unisexual plants are turned into monogamous plants, the so-called hermaphrodites. For commercial production purposes, cannabis growers now only produce female hemp seeds by chemically inducing female hemp plants to produce pollen themselves. The height of the stem can vary between 20 cm and 6 m, or even more, although the most common plants are those from 1 to 3 m tall (UNODC, 2009). Specifically constructed laboratories or greenhouses are used for the illegal production of marijuana in these cultivating conditions. The flower of the female plant is used in the production of marijuana. Despite the fact that it has its application in both industry and medicine, due to its psychoactive properties, cannabis is on the list of prohibited substances in most countries of the world, and its production and use are legally prohibited. According to the 2016 World Drug Report drawn up by the United Nations Office on Drugs and Crime (UNODC, 2016), cannabis is the world's leading illegal substance in terms of cultivation, production, resale and the number of users. Cannabis is grown illegally outdoors, in soils of varying quality and in almost all parts of the world except in the polar regions. Due to the reduced risk of detection, the possibility of controlling the cultivation conditions, the possibility of obtaining higher yields and the possibility of obtaining the final product with a higher percentage of THC (Leggett & Pietschmann, 2008), the illegal producers more often opt for cultivating cannabis indoors or in laboratories rather than outdoors on plantations.

METHODOLOGY

This research is exploratory in its character. The general hypothesis is as follows: A significant number of illegal laboratories for the commercial production of marijuana has been discovered in the Republic of Serbia. A significant number means that more than a hundred of them were discovered in the observed period.

In accordance with the aims of this research, specific hypotheses have also been made:

1. Illegal laboratories for indoor marijuana cultivation are most often installed in residential premises and in urban areas.
2. Illegal marijuana production is dominated by individual producers whose primary goal is to make a profit.

The research included 138 illegal laboratories for the production of marijuana (indoor cultivation of marijuana in laboratory conditions), which is the number of all the discovered laboratories for the production of marijuana in the territory of the Republic of Serbia (excluding Kosovo and Metohija) in the period from 1 January 2013 to 30 June 2019 (data from 2019 were incomplete). Data from the Department of Analytics of the Ministry of the Interior of the Republic of Serbia were used. This Department records all cases of discovered clandestine laboratories on the territory of Serbia, regardless of whether they had produced natural or synthetic drugs.

For the purposes of this paper, a part of the research that was conducted during 2019 will be presented. It analyzed the following: the distribution of detected laboratories by cities, the location of clandestine laboratories, the amount of seized stems, the amount of seized drugs in the drying phase, the amount of dried drugs (final product) and the number of arrested persons in laboratories.

Based on the obtained data, we will point to the main characteristics of illegal cannabis producers in our country.

IBM SPSS Advanced Statistics 20.0 package was used for the statistical data analysis.

RESULTS

In the period from 1 January 2013 to 30 June 2019, 138 illegal laboratories for the production of marijuana (indoor cultivation) were discovered. Most laboratories were detected in urban areas (80.9%), while 19.1% were detected in rural or suburban areas. Most laboratories were discovered in Belgrade (37). The result has been expected and it is in line with the Public Security Strategic Assessment drawn up by the Ministry of the Interior in 2017. The abovementioned assessment states the following: "Most organized criminal groups operate in Belgrade, the dominant criminal activity of these groups is illegal production and trafficking of narcotic drugs, which is carried out by 86.2% of the registered organized criminal groups (Public Security Strategic Assessment – public version, 2017). In addition to Belgrade, a significant number of these laboratories were discovered in Novi Sad (12) and Subotica (12), followed by other major cities in Serbia (Figure 1). These data also unequivocally confirm the practice of laboratories being installed by producers near consumers in order to reduce the risk of detection in the case of smuggling of products to end consumers.

Figure 1. Number of clandestine laboratories in the Republic of Serbia (excluding Kosovo and Metohija) per locations where they were discovered

There are different locations where illegal laboratories are installed and then discovered. Having used and analyzed the data obtained from the Department of Analytics of the Ministry of the Interior of the Republic of Serbia, we reached a conclusion that residential areas are the most common places where illegal laboratories for marijuana production are discovered - 123 (89.1%) (Table 1). However, criminal practice, both in Serbia and in other European countries, shows that laboratories can also be found in utility rooms, sheds, garages, motels, halls, office spaces, car repair garages, camper trailers and the like (Otasevic & Atanasov, 2018).

Table 1. Locations where clandestine laboratories were discovered

	f	%
Houses, appartments, holiday homes	123	89.1
Basements and utility rooms	10	7.2
Office spaces, halls	4	2.9
Car repair garages	1	.7
Total	138	100.0

The locations where illegal laboratories were discovered in most cases were owned by illegal producers - 132 (97.1%), while only four illegal laboratories were installed in rented spaces. This statistic confirms the claim that growers usually keep the laboratory close to themselves in order to control it more easily, i.e. to protect it (Otasevic, Kolarevic, & Radovanovic, 2019). In 51 (37%) of the discovered laboratories, marijuana was found at different stages of the production process: stems of different heights, marijuana at different stages of the drying process, dried and packaged marijuana ready for distribution on the illegal drug market. In 42 (30.4%) of the laboratories, only marijuana stems were detected, while drying marijuana or dried marijuana was detected in 40 laboratories (29%). In 5 laboratories only, the installed equipment was discovered and no drugs were seized, which most likely indicates good preventive work of the police. We assume that in these cases the illegal producers procured the equipment with the intention of starting illegal drug production, but they were discovered before the illegal laboratory started production (Table 2).

Table 2. Different stages of the production process

	f	%
The amount of seized marijuana at the drying stage or already dried (final product)	40	29.0
Marijuana stems	42	30.4
Final product and stems	51	37.0
Equipment only	5	3.6
Total	138	100.0

Police administrations report on the seized amounts of marijuana in the following various ways: by the number of seized plants (where there is no data on the size or at least an attempt to ascertain whether the seized stems are of the same or similar height, in order to at least partially determine the cultivation stage); by total weight in the raw state; by total weight after drying; and by the amount of seized dried marijuana ready for illegal distribution. Due to the heterogeneity of reporting, it is not possible to accurately convert the data from one measure to another for practical purposes. As a result, for the purposes of this paper, two sets of data (the number of stems detected and the amount of dried marijuana ready for further distribution) will be analyzed separately. If we add to these data the data on the amount of seized marijuana in the raw state expressed in kilograms and at different stages of the drying process, we can conclude that this would prevent additional analysis and reliable estimates of the extent of domestic marijuana cultivation on a yearly basis in our country.

In the observed period, marijuana stems of different heights were detected in 78 (56.5%) laboratories, i.e. at different stages of the production process. Up to 10 stems were detected only in 10 (7.2%) laboratories. In other laboratories, more than 10 stems were detected, while in 8 (5.8%) laboratories, plantations of over 1000 seedlings were detected (Table 3). These data unequivocally show that indoor marijuana cultivation is dominated by commercial producers. Unlike unauthorized production for personal use, which involves meeting one's own needs or the needs of the household, the goal of commercial production is not the direct use of the product, but its further distribution, unauthorized sale and thus making a large profit.

Table 3. Number of cannabis seedlings discovered

Stems	f	%	Valid Percent	Cumulative Percent
From 1 to 10	10	7.2	12.8	12.8
From 11 to 100	31	22.5	39.7	52.6
From 101 to 500	19	13.8	24.4	76.9
From 501 to 1000	10	7.2	12.8	89.7
Over 1000	8	5.8	10.3	100.0
Total	78	56.5	100.0	
No stems	60	43.5		
Total	138	100.0		

For comparative purposes, Uruguay was the first country in the world to adopt Law No 19,172 in 2013, which prescribes recreational cultivation, production, sale and use of cannabis. Thus, in fact, Uruguay became the first country to legalize marijuana. In accordance with the valid legal regulations, during registration, the user of marijuana is obliged to opt for one of the three permitted methods of supply: through pharmacies, through cannabis clubs or through home production (Stojic, 2018). The main restriction on the production of cannabis at home refers to a maximum of six permitted plants, and a limit of a maximum of 480 grams of final product a year (UN Office on Drugs and Crime, 2017).

In 74 (53.6%) laboratories, marijuana was found ready for further distribution and street sale. The amount of up to 100 grams of marijuana was found in only one laboratory, the amount of between 100 grams to 1 kilogram was found in 27 (19.6%) laboratories, while in 8 laboratories the amount of over 20 (5.8%) kilograms was found (Table 4). The data related to the amount of seized stems (Table 3), as well as data related to the amount of seized marijuana in laboratories throughout Serbia, confirm the hypothesis that the indoor cultivation of marijuana is dominated by commercial producers. This hypothesis is also confirmed by the fact that in the fifty-first (37%) laboratory discovered, during the incursion, seedlings of different sizes were seized, as well as a certain amount of the final product. In these cases, illegal producers had ensured that there was a certain amount of drugs ready for the illegal drug market at all times. In a study conducted in the Netherlands, Spence and co-authors concluded that the main motive for this group of growers is financial gain. Compared to non-commercial growers, commercial growers pay less attention to product quality, focusing on cannabis varieties that grow faster and give higher yields (EMCDDA Insights, 2012).

Table 4. Quantity of seized marijuana (final product) prepared for further distribution

	f	%
Up to 100 g	1	.7
From 100 g to 1 kg	27	19.6
From 1 kg to 5 kg	22	15.9
From 5 kg to 10 kg	10	7.2
From 10 kg to 20 kg	6	4.3
Over 20 kg	8	5.8
No quantity was discovered	64	46.4
Total	138	100.0

In 136 laboratories discovered (there were no data for two laboratories), 196 persons were deprived of liberty, whose average age was 38 (+/- 10). Out of that number, one person was arrested in each of the 96 (68.4%) laboratories discovered, no person was found in 7 laboratories at the time of the police incursion, in 6 laboratories more than 5 persons were arrested, and in two laboratories more than ten persons were arrested (Table 5).

Table 5. Number of arrested persons per laboratories

Number of persons	Number of laboratories	%	Total number of perpetrators
1.00	93	68.4	93
2.00	25	18.4	50
3.00	5	3.7	15
4.00	3	2.2	12
6.00	1	.7	6
10.00	2	1.5	20
Total	129	94.9	196
No arrests	7	5.1	
	136	100.0	

DISCUSSION

The results of the conducted research have indicated that the illegal production of cannabis in laboratory conditions in our country can no longer be considered marginal, because 138 illegal laboratories for the production of marijuana were discovered in the observed period of 5.5 years. The increase in domestic production may be due to the increased risk of detection in cases of marijuana smuggling from neighbouring countries such as Albania or Montenegro, in our case. However, the number of laboratories discovered and the amount of seized drugs unequivocally indicate that illegal production is simple and easy to organize at home. Indoor cultivation can be organized wherever there is access to electricity and water. Also, information on marijuana cultivation is easily available and can be found on the Internet. Some presentations provide procedures (step by step) for successful cultivation. There you can also find advice on agricultural measures necessary for good yields, including procedures and pesticides for plant protection, which are used in this production (Otasevic, Kolarevic, & Radovanovic, 2019). Recently, cannabis grow journals and instructions on how to keep them can be found on the Internet. The components of these journals are photographs of high-quality equipment, the type of lighting used, as well as photographs of the different stages of the production process.

The main precondition for successful indoor cultivation of cannabis is the use of extraordinary high-quality lighting systems. Cannabis growth is strongly associated with light intensity (Chandra et al., 2008), and in order to maximize yields, illegal producers must create light indoors, which is similar to that in the natural environment.

The equipment used to grow plants indoors (plants such as flowers or vegetables) can also be used in the illegal production of cannabis. This practically means that permitted products can be used for prohibited purposes. In this regard, some authors (Jansen, 2002) claim that the increase in the number of shops and online shops which sell all types of equipment necessary for growing plants, the so-called "Growshops", have contributed to the spread of cannabis cultivation in the Netherlands, emphasizing that cannabis production requires knowledge that can be acquired in such shops. In their opinion, information is more important than the equipment itself, referring to "Growshops" as "the centers of knowledge".

The results of research conducted in Europe also indicate that the total amount of electricity used in cannabis production, from the day of planting to the day of harvest, is approximately 1 kw per gram of dried flower material produced. Where energy consumption data are available, they can be useful indicators of the likelihood of illegal cannabis yields; but also, in criminal investigations, they can be indicators that illegal marijuana production is taking place (EMCDDA Insights, 2012).

The volume of illegal production of marijuana and other cannabis products in our country is currently impossible to be estimated. The available data on marijuana seizures are fragmented, non-standardized, and largely scientifically unfounded. One of the problems with estimating the production volume is the great diversity in cultivation methods that can be applied, but also the lack of standardized reporting forms at the national level. However, it should be noted that Serbia is no exception in this regard, because due to the different methods used in cultivation, it is almost impossible to estimate global cannabis production with precision that would be satisfactory for practical needs.

Police practice across Europe shows us that the areas where cannabis is grown are very diverse, from home growers who grow cannabis for personal use to large commercial plantations that can produce huge amounts of drugs. UNODC has estimated that the annual income can be from 5 kilograms per hectare in cases of wild cannabis growth, to 40 tons per hectare in the case of hydroponically grown plants.

In the observed period, seizures of over 100 cannabis stems were most frequently detected in our country, while up to 10 stems were detected only in 10 (7.2%) laboratories. If we take into account the fact that in one laboratory the amount of dried marijuana (final product) of up to 100 grams was seized, as well as the fact that seizures ranging from 5 to over 20 kilograms are most dominant, then it is clear that laboratory production of marijuana is not intended to meet personal needs, but it is commercial production that aims to further sell the final product. As we have already mentioned, commercial growers do not take care of the quality of the product, and therefore the health of consumers, but their goal is to make a profit. This is confirmed by the results of previous research which showed that a large number of cannabis samples confirmed contamination, meaning the existence of fungi and bacteria that are harmful to health (Hazekamp, 2006, 4). The harvested material (flower of the female plant) must be dried immediately after harvesting, in order to avoid spoilage and contamination, various bacteria, mould and the like. This process takes one to two weeks, and the instructions found online suggest that slower drying in the production process improves the final taste.

A study conducted in 2006 in the Netherlands showed that the average number in one Dutch indoor laboratory amounts to 259 plants. The authors estimated the average yield of female flower buds per plant at 33.7 grams and the average yield per square meter at 505 grams. The Dutch Bureau for Confiscation of Criminal Assets proposed the application of a lower limit of the simple 95% confidence interval, which, in this case was 28.1 g/plants, or 399 g/m2 (Toonen, Ribot, & Thissen, 2006).

Recent studies on indoor cannabis production conducted in Belgium have shown that the type of cannabis used is the main factor which determines the yield, although light intensity and plant density are also important factors (Vanhove, Van Damme, & Meert, 2011, p. 160). In one of their indoor cannabis cultivation experiments, Vanhove and colleagues found that cannabis yields differed significantly for different plant varieties, and suggested that the lower limit of the unilateral 95% confidence interval in indoor cannabis plantations be set at 575 g/m2 (Vanhove et al., 2012). These results are applicable only to the Belgian-Dutch area, which is in many ways unique, and cannot be applied in the wider European context. However, it should be emphasized that these studies provide insight into the otherwise relatively unknown drug market and give some indications of possible production capacities of the closed plantations.

One person was arrested in each of the 96 (68.4%) detected laboratories. It is our opinion that independent growers are dominant in Serbia and they are independently engaged in the production of cannabis in private houses and apartments and usually grow between 100 and 1000 plants in one harvest. Those who are "more successful" among them invest a part of their profits into expanding the production. This is achieved by providing additional locations (buying or renting) in order to grow more plantations. These growers usually choose the variety of cannabis that will have the most harvests a year. Their primary motive is profit and if it were not for the financial gain, they would not be engaged in illegal production. Some of them may have non-financial motives, such as product quality, but they are certainly not primary.

The fact that two persons were arrested in each of the 25 (18.4%) laboratories and the fact that 3 or more persons were arrested in each of the 11 (14.2%) laboratories indicate a trend of organized criminal groups taking part in marijuana production. In the criminal legislation of the Republic of Serbia, a group means at least 3 persons who are connected for the purpose of permanent or occasional committing of criminal offences, who do not have to have defined roles of their members, continuity of membership or a developed structure (CC Article 112). These groups own large plantations of over 1000 stems and quantities of over 10 kilograms of the finished product.

An outstanding example from 2019 refers to the agricultural estate "Jovanjica" where illegal marijuana production was discovered at several locations. On that occasion, 9 members of an organized criminal group were deprived of liberty, and as many as 649.9 kilograms of marijuana and 65,581 raw cannabis stems, weighing 3,954 kilograms, were seized.

In the Republic of Serbia, there are 58 organized crime groups (OCGs) of high (8.6%), medium (44.9%) and low (46.5%) levels of organization. The dominant criminal activities of these groups are drug smuggling and illegal drug production and trafficking, in which 86.2% of OCGs are involved in. Some of these groups are involved in the illegal production of marijuana (Public Security Strategic Assessment - public version 2017). These groups have several cultivation sites at the same time, where they produce serious amounts of cannabis simultaneously. As in other areas of crime, so in the illegal production of cannabis, OCGs are hierarchically organized, there is a strict division of labour and numerous specializations that some members of these groups have. Specialists are in charge of performing very specific tasks in the chain of illegal cannabis production, from the selection of lighting and cannabis varieties, through the cultivation and stimulation of plant growth to the preparation of final products (flower cutting, drying, pressing and packaging). These allegations have been practically confirmed in the police practice in Serbia.

An interesting criminal investigation took place in April 2014 when employees of the Service for Combating Organized Crime in a joint action with the police officers of the Special Anti-Terrorist Unit deprived of liberty a nine-member OCG which, in the period from October 2013 to April 2014 was engaged in illegal production of marijuana in artificial conditions. The leader of this criminal group financed and organized the production and distribution of marijuana, he looked for facilities, bought equipment, cannabis seeds and substances necessary for growing cannabis. The other two members, brothers, were in charge of installing the technical equipment.

The fourth was in charge of transporting saplings and storing marijuana in his house. The fifth member was in charge of transporting equipment, cannabis seeds and chemicals used for the care, nutrition and growth stimulation of plants from EU countries. Some members of the group bought houses in which they installed new laboratories for the illegal production of marijuana. In this police action, 2.154 cannabis plants and 800 grams of dried marijuana ready for further sale were seized (Data provided by the Department of Analytics of the Ministry of the Interior of the Republic of Serbia).

Considering the fact that the illegal production took place in several locations, the quality of the equipment, especially the lighting, the number of stems of different heights and the production capacities of the laboratory, it can be concluded that it was a highly profitable laboratory. A small amount of seized drugs means that the producers did not leave "the goods" on the shelves for a long time, indicating a high level of trafficking.

In the fight against this type of drug crime, modernly equipped police boasts using thermal imaging cameras that record heat emission, turning infrared radiation into radiation that is visible to the naked eye (Otasevic & Kolarevic, 2020, p. 18). The information obtained in this way is the starting point for further operational work in order to detect and uncover cannabis cultivation laboratories. Finally, we can conclude that the proactive work of the police and the prosecution contributes to increasing the efficiency of the preliminary investigation procedure for criminal offences in the field of drug crime; and the efficiency of the criminal procedure depends on the efficiency of the preliminary investigation procedure.

CONCLUSIONS

The results of the conducted research confirmed all three hypotheses. The number of laboratories discovered (138) in the observed period indicates that laboratory cannabis cultivation in our country cannot be considered marginal. However, the true extent of illegal production of marijuana and other cannabis products is impossible to be estimated due to the lack of serious scientific research in this area, but also due to the lack of a solid database and standardized reporting forms at the national level. The available data on marijuana seizures are fragmented, non-standardized, and largely scientifically unfounded. A well-designed database with quality software is a must-have in the modern time, and it would be a very significant resource. For the comprehensive use of this resource it would be necessary for it to be handled by qualified analysts.

A quality search could lead to information that is not visible at first glance, and which could be the key for undertaking proactive criminal investigations. Such information would also provide a good foundation for scientific research whose results would be useful for practical purposes.

The amount of seized drugs and the number of arrested persons in laboratories indicate that individual cannabis growers are dominant in Serbia, whose main goal is to expand production and make a profit. However, the fact that in each of the 11 (14.2%) laboratories, 3 or more persons were arrested indicates a trend that organized crime groups take part in this field of crime. This was confirmed by the case of the agricultural estate "Jovanjica", where a mega cannabis plantation was discovered at the end of 2019 and whose production capacities had exceeded the needs of the local drug market. The abovementioned case points to the conclusion that the work of the police and prosecutor's offices should be directed towards larger criminal organizations, and not towards individual cannabis producers. The fact that illegal consumption is more and more getting financed from domestic illegal production will affect the fact that in the future marijuana and other cannabis products will continue to be easily available on the local drug market at an extremely low price. Such trends in marijuana production will directly affect the increase in consumption and greater accessibility, especially to minors who are seen as a particularly vulnerable category in terms of marijuana consumption.

With regard to the drug market in Serbia, we believe that seizures in our country represent a negligible part of national consumption. However, due to the lack of an adequate methodology, it is not possible to assess national consumption with a degree of precision that would be significant for practical needs. Based on the presented data, it is not possible to perceive the scale of the problem, nor can adequate prevention measures be planned.

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