



**Stadt Zürich**  
Soziale Einrichtungen  
und Betriebe

# **Cannabis Evaluation**

## **Drug Checking at the Drug Information Center Zurich 2022**

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# 1 Cannabis evaluation 2022

## 1.1 Introduction

Cannabis products (weed, hashish, pollen, oils, liquids, etc.) are extracted from the hemp plant. The main active ingredients are THC (tetrahydrocannabinol) and CBD (cannabidiol). THC is responsible for the majority of the psychoactive effects, while CBD has a calming, neuroprotective, antispasmodic and noise-reducing effect.

Cannabinoid receptor agonists (cannabimimetics), also known as synthetic cannabinoids, are similar to THC in their effects. Cannabimimetics mimic the effects of THC. These substances dock at the same sites in the brain as THC, but with up to more than 100 times stronger binding. This leads to a significantly more intense effect and increases the risk of overdose.

## 1.2 Risk assessment

For cannabis, the higher the THC content, the greater the risk of adverse effects. With high-dose cannabis (high THC content), circulatory problems up to circulatory collapse or even anxiety, panic and paranoia can occur.

Synthetic cannabinoids were [first detected in early 2020](#). In addition to the known side effects of [cannabis](#), synthetic cannabinoids pose an additional health risk for all users which is difficult to assess. Physical symptoms often appear immediately after use, ranging from nausea, vomiting, sweating, palpitations, dizziness, and motor difficulties to paralysis or unconsciousness. The latter poses the risk of accidents, such as falls. Undesirable psychological side effects include panic attacks, hallucinations or dissociative sensations. As can be seen from the following statistics, the samples tested positive for synthetic cannabinoids by the DIZ have decreased sharply.

Many of the 2022 cannabis samples analyzed by DIZ (mainly cannabis flowers containing THC) have a very unbalanced THC/CBD ratio. Most of these samples contained little or only traces of the active ingredient CBD. These cannabis products therefore pose a greater health risk than those with higher levels of CBD. [Scientific research](#) indicates that these cannabis products with an unbalanced THC/CBD ratio pose a higher risk for the development of psychosis.

When consuming cannabis products ("edibles"), the dosage is more difficult to estimate (than, for example, with smoking) and risks and side effects are more unpredictable. In addition, when consuming edibles, the onset of action and the duration of action are delayed: the active ingredient enters the body and unfolds its effect only 20 minutes to 2 hours after ingestion (depending on the method of preparation and the contents of the stomach). This can lead to overdose. Compared to smoking, the effect of cannabis lasts much longer when eaten. A duration of effect of 8 to 14 hours is to be expected.

Cannabis products cannot be visually and/or taste tested for their ingredients. Synthetic cannabinoids as well as the exact active ingredient content (potency and THC/CBD ratio) can only be determined by precise chemical analysis. Furthermore, cannabis products are repeatedly stretched with organic and inorganic products to increase profits. For more details on extenders, see [2.2 Extenders and impurities](#).

## 2 Analyzed samples

In 2022, a total of 398 cannabis samples were handed in for analysis at the Drug Information Center (DIZ) Zurich. 267 samples were cannabis flowers, 107 samples were hashish and 24 samples were other cannabis products such as oils, liquids, edibles and dabs (cannabis concentrate).

304 of these samples were submitted without suspicion of synthetic cannabinoids. They were brought for analysis by the users, who were looking for information about the composition of the substances and the associated risks. Synthetic cannabinoids were found in 5 of these samples, contrary to the users' expectations.

In the case of the remaining 93 samples, the users suspected, based on concrete negative experiences, that their substance had been mixed with synthetic cannabinoids. In only 3 of these suspicious cases synthetic cannabinoids could be detected.

### 2.1 THC and CBD content

374 samples were analyzed for their THC and CBD content in cannabis drug checking in 2022. In 24 additional samples submitted, it was only possible to determine whether the flower or the hashish had been treated with synthetic cannabinoids.<sup>1</sup>

The results of the DIZ regarding THC content are roughly in line with figures from other black market investigations, such as those of the Swiss Society of Forensic Medicine (SGRM).<sup>2</sup> In the context of cannabis drug checking, data on CBD content in cannabis samples is being collected for the first time. As a result, the long-suspected unbalanced THC/CBD ratio in flowers could be detected for the first time in 2021. This finding was confirmed in 2022. Thus, 64 of the tested flower samples had a CBD content below 0.1 %, which also explains the low average CBD content.

The THC and CBD values of the flower and hashish samples analyzed in the DIZ in 2022 are given below. Not taken into account were all samples that were a CBD type<sup>3</sup>

- The **average active ingredient content of the cannabis flowers** tested in the DIZ was **13.3 % THC**. The active ingredient content of the analyzed cannabis flowers varied greatly with between 1.2 % and 27.0 % THC.
- The **average active ingredient content of the cannabis flowers** tested in the DIZ was **1.1 % CBD**. The active ingredient content of the analyzed cannabis flowers varied greatly and ranged from 0.0 % to 14.5 % CBD.

<sup>1</sup> These 24 samples were not submitted as part of the cannabis drug checking. In case of a suspicion of synthetic cannabinoids, it can be determined within the regular drug checking whether the sample was sprayed with synthetic cannabinoids; a THC/CBD analysis is then not possible.

<sup>2</sup> <https://www.sgrm.ch/de/forensische-chemie-und-toxikologie/fachgruppe-forensische-chemie/statistiken-thc/>

<sup>3</sup> Samples with a THC content of less than one percent THC and/or a very noticeably higher CBD than THC content.

- The **average active substance content** of the **hashish** tested in the DIZ was **24.4 % THC**. The active ingredient content of the hashish analyzed varied widely, ranging from 1.2 % to 41.4 % THC.
- The **average active ingredient content** of the **hashish** tested in the DIZ was **3.4 % CBD**. The active ingredient content of the analyzed hashish varied greatly and ranged from 0.5 % to 32.8 % CBD.

Due to the small number of samples of oils, liquids and edibles, these samples will not be discussed in more detail.

## 2.2 Extenders and impurities

It has been known for some time that cannabis products can be stretched with non-psychoactive substances to optimize profits. (e.g. Brix, lead, sand, etc.). For example, Brix or sand are added to increase the weight of the cannabis products. These substances are sometimes visually recognizable on the flowers: sand usually settles at the bottom of the storage container. If Brix is suspected in cannabis, a small amount of the flower can be burned. Samples spiked with Brix burn very poorly, the ash is rather hard and feels greasy and oily when rubbed. Further, mold can form due to improper drying/storage.

In addition, fertilizers are often used in cannabis cultivation to promote growth, which remain in the plant as residues if not handled properly. Consumption of these substances poses an increased risk to the health of users. With the analysis in the DIZ, these impurities cannot be detected. Apart from fertilizer residues, many extenders can be detected by eye or by smell. A detailed list of the most common cannabis extenders can be found on the website of the German Hemp Association. <sup>4</sup>

In the case of illegally purchased liquids, cases are known in which thickening agents such as vitamin E acetate have been added, which according to a study<sup>5</sup> are extremely harmful to health and have already led to several deaths in the USA. These cases have become known as EVALI (*e-cigarette, or vaping, product use associated lung injury*). However, no further deaths associated with EVALI have been reported since the publication of this study. Nevertheless, with illegal e-liquids, it is recommended to use cannabis drug checking whenever possible or, if this is not possible, to test the e-liquids cautiously.

<sup>4</sup> <https://hanfverband.de/inhalte/streckmittel-in-marihuana-wie-man-sie-erkennt-und-welche-risiken-von-ihnen-ausgehen>

<sup>5</sup> <https://www.nejm.org/doi/full/10.1056/NEJMoa1916433>

## 2.3 Synthetic cannabinoids and other ingredients in cannabis samples

THC and CBD are naturally occurring cannabinoids in the cannabis plant. At the beginning of 2020, synthetic cannabinoids were detected for the first time at the DIZ<sup>6</sup>. This sudden and frequent occurrence of such samples suggests that various traffickers have acquired legal CBD cannabis on a large scale, which has become cheap due to overproduction and the associated price collapse, and have added synthetic cannabinoids to subsequently resell it deceptively as illegal cannabis containing THC.

In 2022, 11 (2.8 %) of all cannabis samples submitted to the DIZ for analysis were spiked with at least one synthetic cannabinoid. 3 of these samples (0.75 %) were spiked with two different synthetic cannabinoids. In 2021, 49 samples (11 %) of all cannabis samples submitted for analysis at the DIZ were spiked with at least one synthetic cannabinoid. 11 of the samples (2.5 %) were spiked with two or more synthetic cannabinoids.

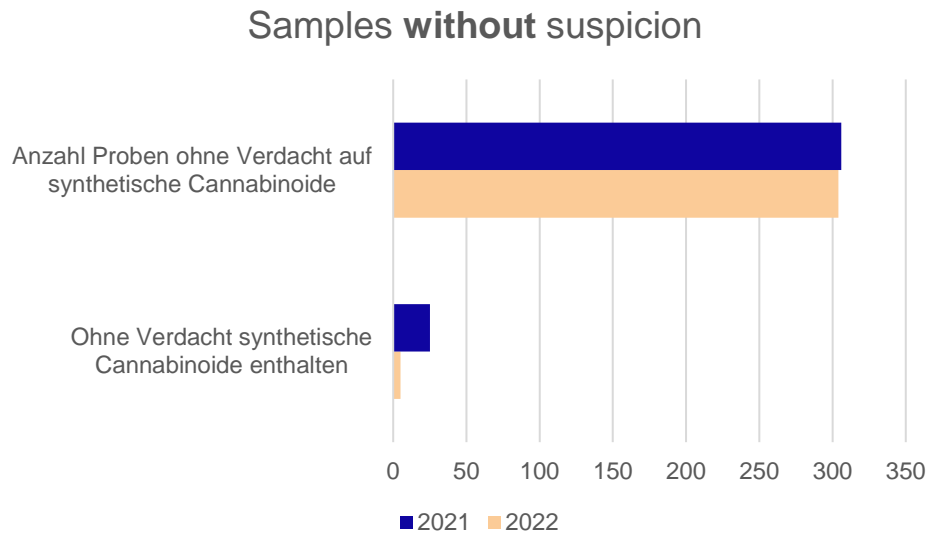
Of the samples for which suspicion of synthetic cannabinoids was expressed at the time of dispensing, only 5 samples (5.3 %) contained such substances. In the samples without suspicion, however, synthetic cannabinoids were detected in 6 cases (1.9 %). The following synthetic cannabinoids were detected in 2022: MDMB-4en-PINACA, 4F-MDMB-BICA, 4-F-ABUTINACA, ADB-4en-PINACA, ADB-BINACA, 5F-MDMB-PICA.

The number of samples testing positive for synthetic cannabinoids once again decreased sharply compared to the previous two years. At the same time, the number of samples submitted as suspicious cases remained quite high. This is probably related to the fact that in the last two years, due to harm-reducing offers as well as media coverage, a broad education on the topic of synthetic cannabinoids and their effects has taken place. The consumption of high-dose cannabis products in large quantities also leads to undesirable side effects that can easily be confused with the effects of synthetic cannabinoids. Thus, these samples are then given with suspicion of synthetic cannabinoids, although they are high-dose THC cannabis products.

Subsequently, the results of the analysis are presented graphically.

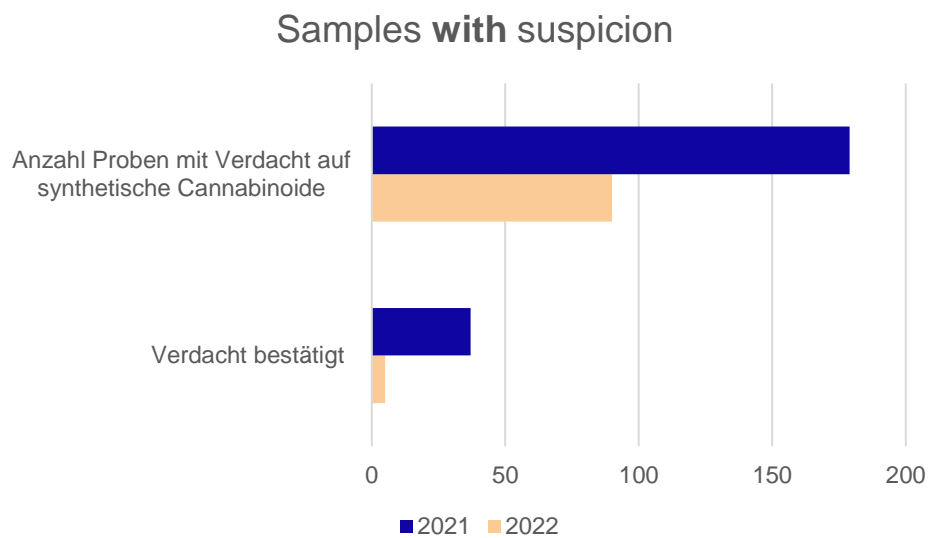
Graph 1 shows all cannabis samples analyzed **without** suspected synthetic cannabinoids.

<sup>6</sup> Also called cannabimimetics, see: <https://www.saferparty.ch/blog/synthetische-cannabinoide-ergebnisse-aus-dem-drug-checking-der-stadt-zurich-januar-bis-august-2020>



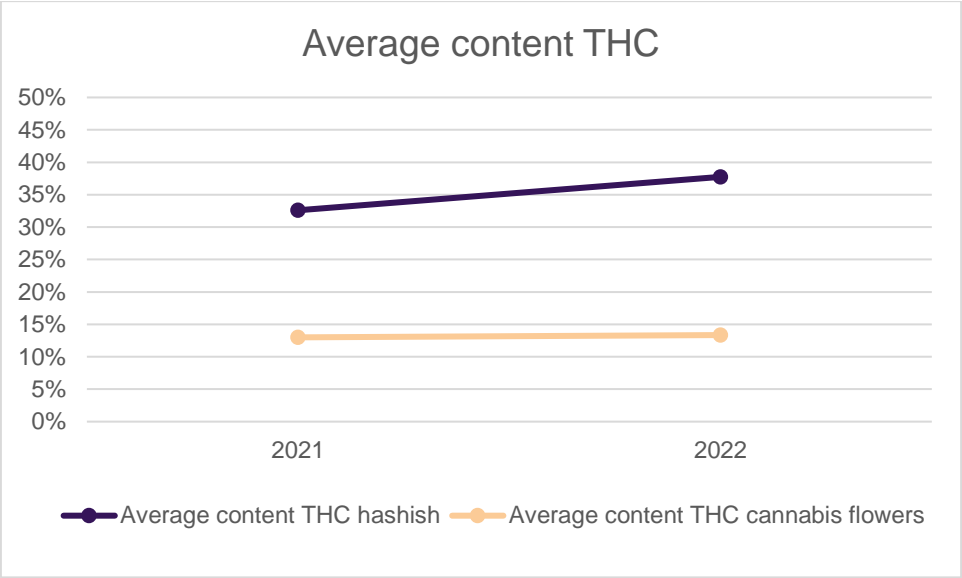
Graph 1: Samples **without** suspected synthetic cannabinoids, 2021 (n=306) and 2022 (n=304).

Graph 2 shows all cannabis samples **with suspected** synthetic cannabinoids.



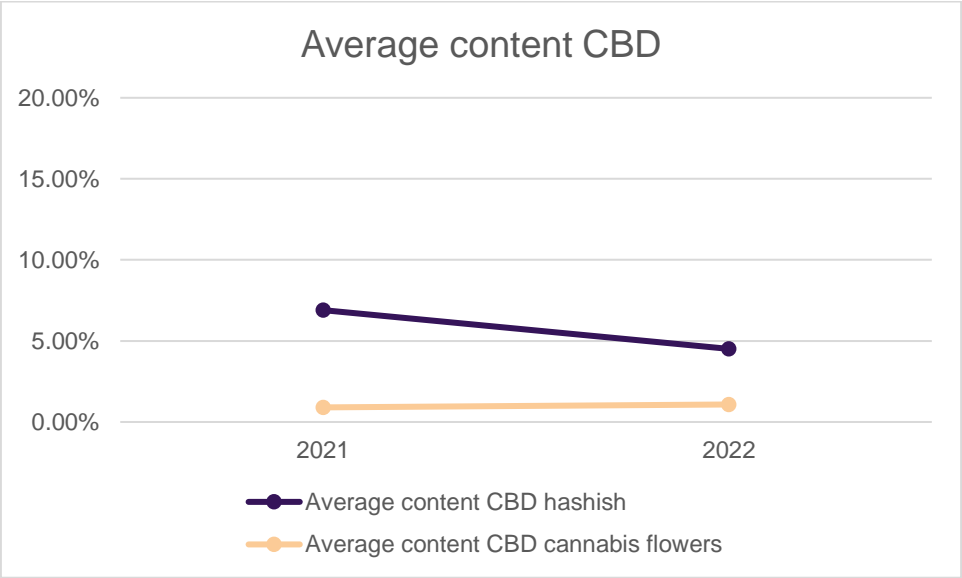
Graph 2: Number of cannabis samples **with** suspected synthetic cannabinoids in 2021 (n=179) and 2022 (n=90).

Graph 3 shows the average content of THC in cannabis flower and hashish.



Graph 3: Number of samples of cannabis flower 2021 (n=) and 2022 (n=231) and hashish 2021 (n=) and 2022 (n=107).

Graph 4 shows the average content of CBD in cannabis flower and hashish.



Graph 4: Number of samples of cannabis flower 2021 (n=) and 2022 (n=231) and hashish 2021 (n=) and 2022 (n=107).

## 2.4 Delta-8-THC

In 2022, eight samples with a strikingly high  $\Delta^8$ -THC value were analyzed at the DIZ.  $\Delta^8$ -THC occurs, if at all, only in very small amounts as a natural cannabinoid in the hemp plant. However, since a strikingly high concentration of  $\Delta^8$ -THC was analyzed in some samples, it is suspected that this was applied to CBD flowers by non-natural means or after the fact. This suspicion is strengthened by the often simultaneously measured high CBD value.

$\Delta^8$ -THC is a psychoactive cannabinoid that produces a similar intoxicating effect as  $\Delta^9$ -THC (the "classic" THC), but is less potent. In all likelihood,  $\Delta^8$ -THC is primarily a by-product produced during the chemical conversion of CBD (cannabidiol) to  $\Delta^9$ -THC. This conversion is presumably used to generate  $\Delta^9$ -THC from low-noise CBD products, or pure CBD. The resulting mixture of  $\Delta^8$ -THC and  $\Delta^9$ -THC is then applied to CBD products in order to sell them on the black market as natural and THC-containing cannabis products. The by-products produced during the conversion process are expected to be toxic. Since synthesis by-products are often not completely separated by the manufacturers and are thus consumed by the consumers together with  $\Delta^9$ -THC and  $\Delta^8$ -THC on cannabis products, an unknown health risk is assumed during consumption. No clinical studies are available on the short- and long-term side effects of  $\Delta^8$ -THC and the synthesis by-products.



### 3 Conclusion

- Cannabis in flower form still has a very low CBD content. Since CBD is thought to have a protective effect (reducing the adverse effects of THC), this is problematic from a harm reduction perspective. It is recommended, especially for cannabis with very high THC content, to mix it with CBD cannabis.
- Cannabis laced with synthetic cannabinoids is still circulating on the black market. However, the number of confirmed samples has decreased significantly.
- After the decrease in synthetic cannabinoids, more samples containing the cannabinoid  $\Delta^8$ -THC were analyzed. This shows that the cannabis market is very dynamic and will probably remain so.

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