Health Canada Santé Canada

Canada

Cannabis Data Gathering Program:

A comparison of legal and illegal dried cannabis products

(Final report)

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Summary

The Cannabis Data Gathering Program (the Program), launched in 2023 by Health Canada's Cannabis Laboratory, helps Health Canada collect information on the composition and quality of cannabis products available in Canada. The Program projects provide new data on cannabis where information may be limited, providing new evidence about potential risks and emerging trends. This strengthens Health Canada's ability to regulate the cannabis industry and inform Canadians about the health and safety risks associated with cannabis use. Information from the Program projects will also guide future regulatory, inspection, surveillance and outreach efforts.

The main objective of this first project under the Program was to generate baseline data on total Delta-9-tetrahydrocannabinol (THC) levels, heavy metals, mycotoxins, pesticides and microbial contaminants in dried cannabis, both legal and illegal, available on the Canadian market. In this initial survey, 100 dried cannabis samples (50 legal and 50 illegal) were tested, revealing the following trends:

- **Total THC levels**: Among legal products, a significant proportion showed total THC levels below their declared amount, with 48% having total THC levels under 80% of their label claim. None of the illegal cannabis products seized by law enforcement included label information when submitted to the laboratory. Analysis revealed wide variability in total THC potency, ranging from less than 100 mg/g to more than 250 mg/g.

- **Heavy metals**: All samples collected were analyzed for a suite of 18 metals. Regarding the 4 most commonly tested metals (arsenic, cadmium, lead and mercury), only one illegal sample had arsenic levels above the United States Pharmacopeia (USP) tolerance limit set for inhalation. Overall, however, these metals were present in a significantly higher proportion of the illegal samples. On the other hand, copper, molybdenum and nickel were found in a large proportion of both legal and illegal samples, some in concentrations exceeding tolerance limits.

- **Mycotoxins**: None of the 6 mycotoxins tested were found in legal products. In contrast, 6 illegal samples tested positive for either ochratoxin A or deoxynivalenol (DON).

- **Pesticides**: Only two legal products showed trace levels (0.01 parts per million [ppm]) of pesticides out of over 300 pesticide residues tested. In comparison, 94% of illegal samples had multiple pesticides, averaging 3.4 pesticides per sample, with a

total of 24 different pesticides identified, some at very high levels. The most commonly found pesticides in illegal samples were myclobutanil and paclobutrazol.

- **Microbial contaminants**: Although a few legal products tested positive for microbial contaminants, illegal cannabis products were found to have significantly higher levels of microbial contamination when compared to cannabis obtained from the legal market, often exceeding European Pharmacopeia (Ph. Eur.) limits. These included opportunistic pathogens such as *Enterobacter cloacae* and bacteria associated with respiratory infections such as *Klebsiella spp.* and *Pseudomonas aeruginosa*.

This survey represents an important step in understanding the composition of dried cannabis available in Canada. By analyzing dried cannabis samples, Health Canada has generated baseline data on total THC levels, heavy metals, mycotoxins, pesticide residues and microbial contaminants, showing significant differences between the legal and illegal markets.

The findings underscore the importance of ongoing data collection to identify trends, inform regulatory decisions and improve product safety. Future projects under the Program will build on these results, enhancing Health Canada's ability to protect public health, guide regulatory actions, and support Canadians in making informed choices about cannabis use.

What is the Cannabis Data Gathering Program?

The Government of Canada is committed to providing the public with the information they need to make informed decisions and minimize the health and safety risks associated with cannabis consumption. The *Cannabis Act* and *Cannabis Regulations* establish a comprehensive legal framework governing the production, distribution, sale, import, export and possession of cannabis in Canada. The purpose of the Act is, among other things, to:

- protect public health and public safety,
- provide access to a quality-controlled supply of cannabis.

Launched in 2023 by Health Canada's Regulatory Operations and Enforcement Branch Cannabis Laboratory, the Cannabis Data Gathering Program (the Program) aims to support Health Canada's efforts to collect data on the quality and composition of legal and illegal cannabis products available on the Canadian market. Through targeted data gathering projects, the Program plays a valuable role in identifying new or emerging hazards, analyzing trends as well as promoting compliance with Canadian regulations. The program strengthens Health Canada's ability to regulate the cannabis industry and inform the public as well as external organizations about potential health and safety risks associated with cannabis consumption.

In addition, the Program will guide future compliance promotion, inspection, monitoring and outreach activities. Where the analyses conducted reveal deficiencies in legal products, appropriate compliance and enforcement actions will be taken to mitigate the identified health and safety risks, where necessary.

Why did we conduct this survey?

The objective of this specific survey was to proactively collect a broad range of analytical data from legal and illegal dried cannabis products. The project included testing for total THC levels, heavy metals, pesticide residues, mycotoxins and microbial contaminants, with the goal of generating initial data on the composition and contaminants present in dried cannabis products available in Canada. Dried cannabis was selected as the first focus of the Program because it is the most commonly used form of cannabis in the country since legalization[a].

[a] Canadian Cannabis Survey 2023, Figure 9

Cannabinoid levels in cannabis products can change over time, impacting their composition and quality. Compounds like THC are sensitive to light, heat and oxygen, which can cause degradation and loss of product potency. This means that the cannabinoid levels listed on the product's label, which reflect the potency at the time of packaging, may not match the actual levels over time. Additionally, some products may show higher total THC levels on the label than they contain due to testing inaccuracy, unrepresentative sampling or the observed phenomenon of THC inflation. For example, if samples are not mixed evenly before testing or if reference standards have degraded, total THC levels may not be representative of the entire lot or batch, leading to inconsistent or inaccurate results on labels.

Contamination is another potential problem with cannabis products and can occur at any stage, from cultivation and processing to packaging. Hot and humid conditions during cultivation can cause mould growth, including *Aspergillus spp.*, which can produce harmful toxins called mycotoxins. Bacteria can also grow if products are stored improperly, especially in humid environments. Pesticides may be present from environmental exposure or deliberate use by growers to protect crops. Metals, which naturally occur in water, soil and air, can accumulate in cannabis plants. Certain metals, such as arsenic, cadmium, lead and mercury, pose health risks even at low levels.

By collecting data on potency and contaminants found in dried cannabis products available on the Canadian market, this survey supports the Government of Canada's ability to regulate the cannabis industry and commitment to providing Canadians with the information they need to make informed decisions and reduce health and safety risks associated with cannabis use.

What did we sample?

A total of 50 legal dried cannabis products were purchased from five retailers across Canada, from both online and brick and mortar stores. These retailers were located in four different geographic regions in Canada: Atlantic, Quebec, Prairies and British-Columbia. We targeted THC products (with little/no cannabidiol (CBD)) containing up to approximately 250 mg/g total THC.

The objective was to select dried (excluding pre-rolled) cannabis products from as many brands, licence holders and provinces of origin as possible. Products were randomly selected from 50 different license holders (Table 1) and sampled between September and December 2023, with packaging dates on products received ranging from October 2022 to September 2023. All legal products collected were labeled with a note stating that "no expiry date has been determined".

Table 1: Distribution of legal products based on province of license holder

Province	Number of products
British Columbia	11
Alberta	4
Saskatchewan	3
Manitoba	1
Ontario	10
Quebec	12
New Brunswick	2
Nova Scotia	5
Prince Edward Island	1
Newfoundland and Labrador	1

As part of this project, 50 illegal samples seized by law enforcement agencies across Canada were submitted to the laboratory for analysis, targeting various sources and locations (Table 2). None of the illegal cannabis products seized by law enforcement included label information when submitted to the laboratory.

Table 2: Distribution of illegal cannabis based on province of seizure

Province	Number of samples
British Columbia	23
Manitoba	2
Ontario	12
Quebec	8
New Brunswick	3
Nova Scotia	1
Newfoundland and Labrador	1

How were samples analyzed and assessed?

All the cannabis products collected were analyzed by Health Canada's Cannabis, Pesticide and Microbiology Laboratories, which are International Organization for Standardization (ISO) 17025 accredited facilities that supports Health Canada's inspection activities related to cannabis. This survey did not take into account how the products were stored on the market. All products were tested in the form they were sold or seized.

In Canada, the *Cannabis Regulations* require that labels on dried cannabis products clearly indicate the amounts of THC and CBD. In addition, any microbial or chemical contaminants must fall within accepted tolerance limits for human use that are appropriate for the intended use and any reasonably foreseeable use of the cannabis product, as detailed in the publications referred to in Schedule B to the *Food and Drugs Act*.

In order to gather data on the composition of both legal and illegal dried cannabis products available on the Canadian market, the following parameters were assessed (Table 3):

Table 3 : Analytical testing parameters and criteria for cannabis products

Analysis	Component tested	Evaluation criteria
Total THC	THC and Delta-9-tetrahydrocannabinol acid (THCA)	While the *Cannabis Regulations* require THC levels to be listed on product labels, it does not set specific variability limits for its concentration.
Heavy metals	Antimony, Arsenic, Barium Cadmium, Chromium, Cobalt, Copper, Gold, Lead, Lithium, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Tin, Vanadium	USP <232> “Elemental Impurities – Limits” (for inhaled products)
Mycotoxins	Aflatoxin B1, B2, G1, G2 Ochratoxin A Deoxynivalenol (DON)	Aflatoxins assessed according to USP <561> “Articles of Botanical Origin”. There are no established tolerance limits for Ochratoxin A and DON in any publication found in Schedule B of the *Food and Drugs Act*.
Pesticide residues	See Appendix A	All pesticide active ingredients detected were quantified. Only cases exceeding the reporting threshold of 0.01 ppm were included in this report.
Microbial contaminants	• Total aerobic microbial count (TAMC) • Total yeast and mold count (TYMC) • Bile-tolerant Gram-negative bacteria (BTGN) • *Escherichia coli* • *Salmonella spp.* • *Aspergillus spp.*	Assessed according to current European Pharmacopeia (Ph. Eur.) 5.1.8 “Microbiological quality of herbal medicinal products and extracts” There are no established tolerance limits for *Aspergillus spp.* in any publication found in Schedule B of the *Food and Drugs Act*.

What were the survey results?

THC levels

Analyses were carried out using reverse-phase ultra-high performance liquid chromatography (UHPLC) utilizing both ultraviolet (UV) and mass spectrometry (MS) detectors.

The total THC concentration declared on products purchased for this project ranged from 143 mg/g to 261 mg/g, with the distribution shown below (Figure 1).

Figure 1: Total THC levels declared on label of legal dried cannabis products

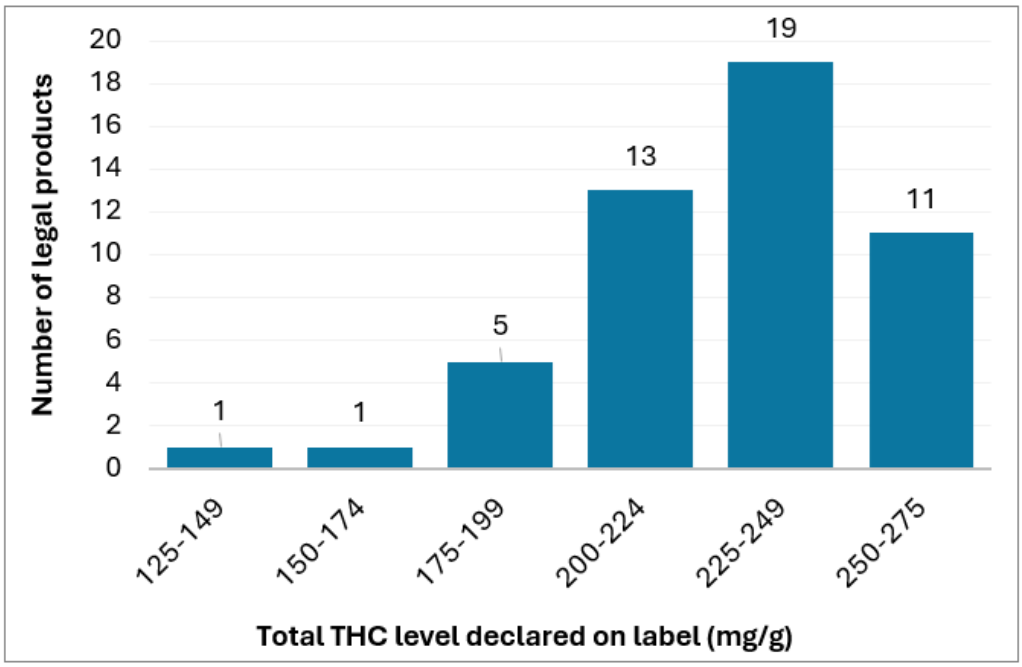
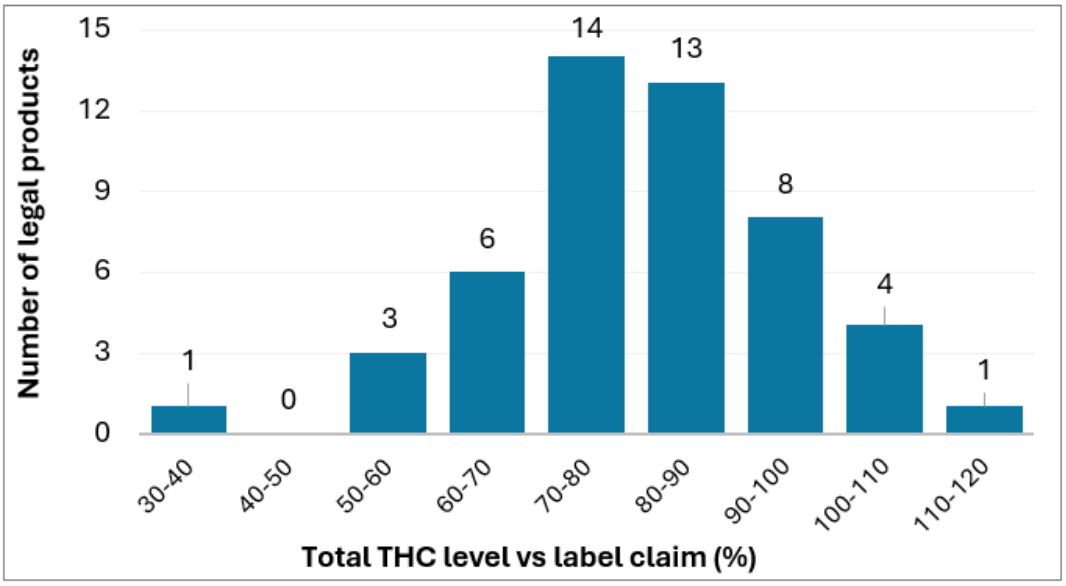


Figure 2 shows the total THC levels in legal dried cannabis products compared to their label claims. Although there is no limit to the variability of total THC concentration in dried cannabis in the *Cannabis Regulations*, 26 products contained 80% or more of their total THC label claim. However, a large proportion of products had total THC levels below 80% of the labeled amount, with 14 products at 70 to 80% and 10 products falling below 70%.

Figure 2: Percent of total THC levels measured compared to the labeled amount in legal dried cannabis products

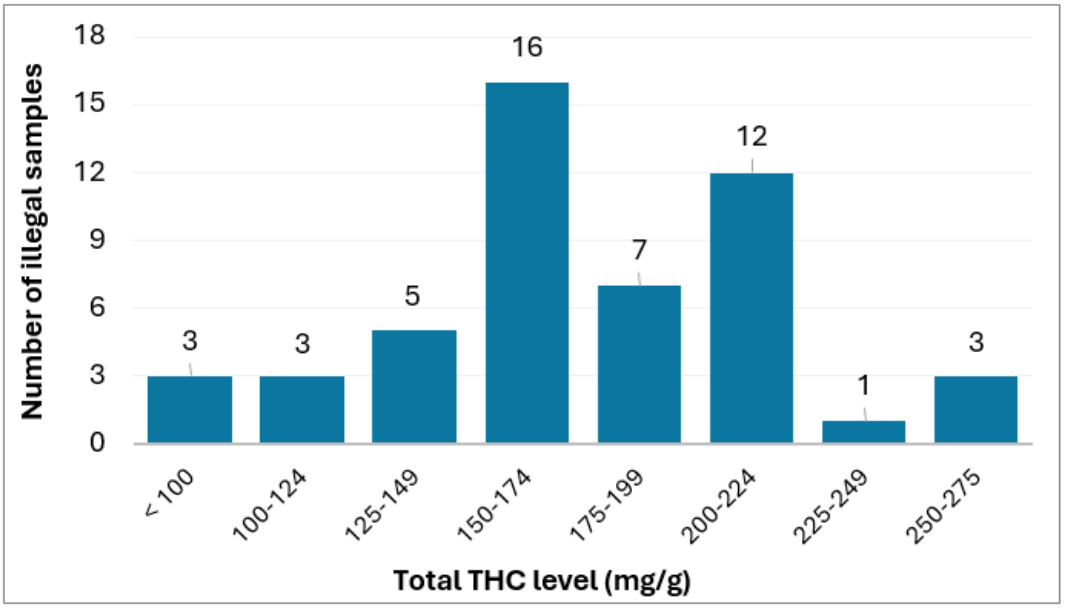


No trends were observed linking elevated total cannabinol (CBN) levels to products with lower than labelled THC levels. Low levels of CBN, being considered a marker for THC degradation, would suggest that the lower total THC amounts are not attributed to degradation of the product. Similarly, no clear patterns were found between lower than labelled total THC levels and packaging date.

These results suggest that while half of the products fall closer to their declared potency, there remains a significant proportion of products with total THC levels below the label amount, which impacts the ability of consumers to correctly dose their cannabis. Inaccurate labels can negatively affect consumer perceptions of legal cannabis product quality and reduce consumer confidence on the legal market.

The analysis of total THC levels in illegal dried cannabis reveals a wide range of potency among the 50 samples tested (Figure 3). A significant portion (23 products) contained total THC levels above 175 mg/g, with a few samples reaching as high as 250 to 275 mg/g, indicating high potency or perhaps cannabis that has been adulterated with kief or additional THC. Meanwhile, 21 products fell between 125 to 174 mg/g, suggesting moderate total THC concentrations. The remaining samples showed lower total THC content, with 6 products measuring below 125 mg/g, including 3 products with total THC levels under 100 mg/g. This variability could perhaps be explained by the different freshness of the samples submitted by law enforcement, as we generally observed higher presence of total CBN in illegal samples with lower total THC concentrations, but sample degradation can’t be confirmed as part of this study.

Figure 3: Total THC levels in illegal dried cannabis



It is not possible to draw conclusions about the typical potency of legal versus illegal dried cannabis as this project only included legal products containing up to approximately 250 mg/g total THC, and that samples from the illegal market were submitted without information on their total THC concentration, origine and date of seizure. It is also important to note that the products sampled for this project may not be fully representative of all legal and illegal products available on the Canadian market.

Heavy metals

The analyses used inductively coupled plasma-tandem mass spectrometry (ICP-MS/MS) to test dried cannabis for 18 metals.

Regarding arsenic, cadmium, lead and mercury, of all the dried cannabis tested, only one illegal sample had arsenic levels above the USP tolerance limit set for inhalation (assuming a maximum consumption of 10 g of dried cannabis per day). Overall, however, these metals were present in a significantly higher proportion of illegal samples. Figure 4 (a, b, c) and Table 4 show the levels of the metals tested in legal and illegal cannabis products, with highest levels measured exceeding tolerance limits in both product categories for some metals, including copper, molybdenum and nickel. Health Canada is currently characterizing the risks associated with these metals.

Key highlights include:

a) **Arsenic**: Present in 44% of illegal products compared with 18% of legal products. One illegal sample (2%) exceeded the USP limit (0.2 µg/g), with a maximum measured concentration of 0.29 µg/g, almost double the highest level observed in legal products (0.16 µg/g).

b) **Barium**: One sample (2%) in each product category exceeded the USP limit (30.0 µg/g). The highest level measured in illegal products (95.26 µg/g) was more than twice that of legal products (40.68 µg/g).

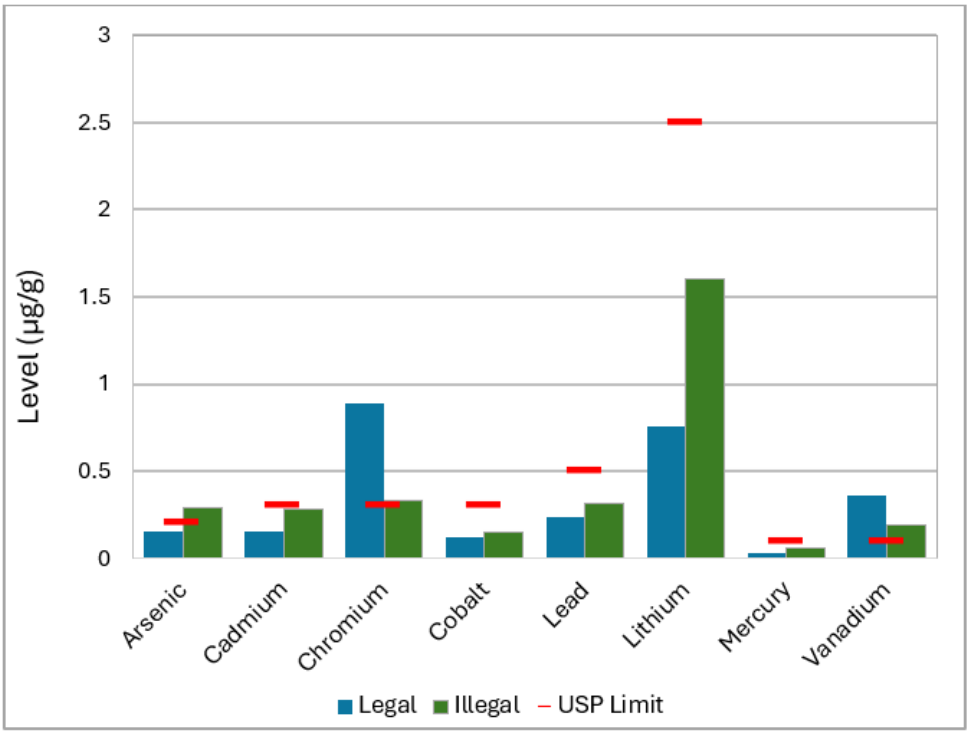
c) **Copper**: Detected in all samples, with 100% of legal products and 98% of illegal products exceeding the USP limit (3.0 µg/g). The maximum level measured in legal products (63.97 µg/g) was more than twice that of illegal samples (24.01 µg/g).

d) **Molybdenum**: Detected in almost all products, with 74% of legal products exceeding the USP limit (1.0 µg/g) compared to 16% of illegal samples. The maximum level measured in legal products (9.93 µg/g) was three times higher than in illegal products (2.47 µg/g).

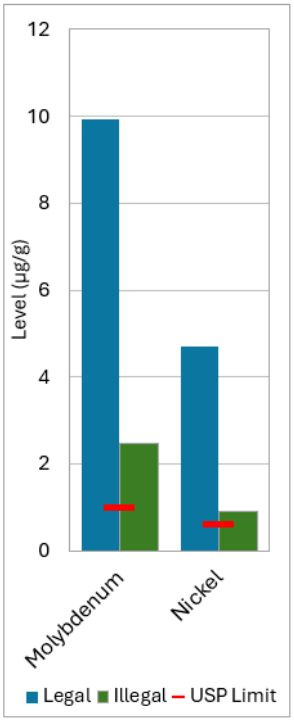
e) **Nickel**: Present in 78% of illegal samples and 72% of legal samples. In total, two samples exceeded the USP limit (0.6 µg/g), namely one legal product (2%) and one illegal product (2%). However, the highest level observed in the legal products (4.69 µg/g) was more than five times higher than in the illegal products (0.91 µg/g).

Figure 4: Highest metal levels measured in legal and illegal dried cannabis

a) Arsenic, cadmium, chromium, cobalt, lead, lithium, mercury and vanadium



b) Molybdenum and nickel



c) Barium and copper

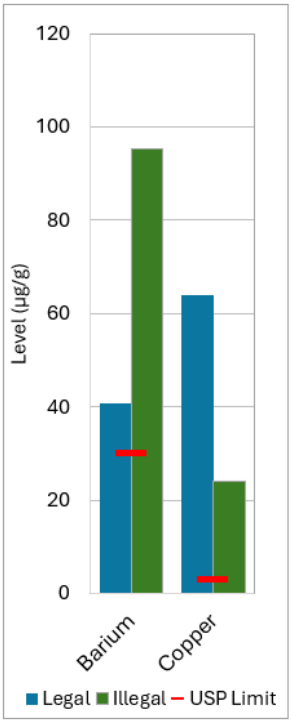


Table 4 : Metal levels in legal and illegal dried cannabis

Metal	USP limit (µg/g)[α]	Legal products			Illegal samples		
		Not detected (%)	> USP limit (%)	Concentration range (µg/g)	Not detected (%)	> USP limit (%)	Concentration range (µg/g)
Antimony (Sb)	2.0	100	0	<0.20	100	0	<0.20
Arsenic (As)	0.2	82	0	<0.02 – 0.16	56	2	<0.02 – 0.29
Barium (Ba)	30.0	64	2	<3.00 – 40.68	62	2	<3.00 – 95.26
Cadmium (Cd)	0.3	82	0	<0.03 – 0.16	50	0	<0.03 – 0.28
Chromium (Cr)	0.3	34	6	<0.03 – 0.89	50	4	<0.03 – 0.33
Cobalt (Co)	0.3	86	0	<0.03 – 0.12	92	0	<0.03 – 0.07
Copper (Cu)	3.0	0	100	3.65 – 63.97	0	98	2.62 – 24.01
Gold (Au)	0.3	100	0	<0.01	100	0	<0.01
Lead (Pb)	0.5	92	0	<0.05 – 0.24	68	0	<0.05 – 0.32
Lithium (Li)	2.5	92	0	<0.25 – 0.76	88	0	<0.25 – 1.60
Mercury (Hg)	0.1	94	0	<0.01 – 0.03	88	0	<0.01 - 0.06
Molybdenum (Mo)	1.0	2	74	<0.10 – 9.93	0	16	0.15 - 2.47
Nickel (Ni)	0.6	28	2	<0.05 – 4.69	22	2	<0.05 – 0.91
Selenium (Se)	13.0	100	0	<1.30	100	0	<1.30
Silver (Ag)	0.7	100	0	<0.07	100	0	<0.07
Thallium (Tl)	0.8	100	0	<0.08	100	0	<0.08
Tin (Sn)	6.0	100	0	<0.60	96	0	<0.60 - 1.41
Vanadium (V)	0.1	78	4	<0.01 – 0.36	78	6	<0.01 - 0.19

[α] Assuming a maximum consumption of 10 g/day.

Mycotoxins

Analyses were carried out using liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS), as per the method described by Desaulniers Brousseau et al. (2024) in the American Society for Testing and Materials (ASTM) Journal of Testing and Evaluation.

None of the tested mycotoxins were found in legal products. In contrast, six illegal samples tested positive for mycotoxins, with three samples containing ochratoxin A, and three containing deoxynivalenol (DON) (Table 5). There are no tolerance limits established in any of the publications listed in Schedule B of the *Food and Drugs Act* for these two contaminants in cannabis.

Table 5: Mycotoxins levels in illegal dried cannabis

Sample	Mycotoxin	Level (ng/g)
Illegal sample 1	Ochratoxin A	23.6
Illegal sample 2	Ochratoxin A	18.6
Illegal sample 3	Ochratoxin A	Present[β]
Illegal sample 4	DON	119
Illegal sample 5	DON	70.8
Illegal sample 6	DON	Present[β]

[β] Insufficient quantity available to confirm exact levels in these samples.

Pesticide residues

Analyses were carried out using a comprehensive multiresidue method combining liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS) and gas chromatography coupled to tandem mass spectrometry (GC-MS/MS) for the simultaneous quantification of >300 pesticide active ingredients in cannabis. All pesticide active ingredients detected were quantified. Only cases exceeding the reporting threshold of 0.01 ppm were included in this report.

Only two legal dried cannabis products were found to contain trace levels of pesticides (myclobutanil and dichlobenil) above the laboratory's declaration threshold of 0.01 ppm. Although quantified in one legal product, dichlobenil is not part of the Mandatory cannabis testing for pesticide active ingredients list, indicating the importance to use expanded multiresidue methods for such data gathering projects.

In contrast, as shown in Table 6, nearly all illegal dried cannabis samples tested positive for pesticides (47 out of 50, or 94% of products), averaging 3.4 pesticides per sample, with a total of 24 different pesticides identified, some at very high levels. Notably,

myclobutanil was present in 72% of illegal samples, with a highest concentration of 130 ppm. Paclobutrazol was found in 60% of the samples, while other commonly detected pesticides included chlorphenapyr (24%), fluopyram (24%), boscalid (26%) and pyrethrins (38%), all at significant levels. Although piperonyl butoxide appeared in just three samples (6%), it was present at an extremely high concentration of 1700 ppm in one of the samples. These results corroborate previous findings (Gagnon et al, 2023).

Table 6: Pesticide residues levels in illegal dried cannabis

Pesticide residue	Samples above 0.01 ppm (%)	Concentration range (ppm)
Bifenazate	12	0.027 – 2.0
Boscalid	26	0.01 - 12
Chlorphenapyr	24	<0.02 – 1.4
Chlorpyrifos	2	0.054
p,p'Dicofol	2	0.018
Dimethoate	6	0.042 – 0.94
Fluxapyroxad	2	0.018
Fluopyram	24	0.016 - 15
Imidacloprid	6	0.018 – 0.10
Malathion	2	0.022
Metalaxyl	4	0.042 -0.14
Myclobutanil	72	0.01 - 130
n-Octyl bicycloheptene dicarboximide	2	0.026
Oxathiapiprolin	2	0.018
Paclobutrazol	60	0.048 – 2.4
Permethrin	10	<0.25 - 28
Picoxystrobin	2	3.0
Piperonyl Butoxide	6	1.5 - 1700
Piraclostrobin	22	0.01 – 4.6
Pyrethrins	38	<0.1 - 14
Pyridaben	2	0.25
Spirodiclofen	2	1.6
Spiromesifen	10	0.3 – 1.5
Spinosad	2	10

Microbial contaminants

A total of 10 legal samples were found to contain microbial contaminants above the European Pharmacopeia (Ph. Eur.) limits, as shown in Table 7. The affected license holders were notified of these results and appropriate compliance and enforcement measures were taken to address each of these cases. In one instance, a voluntary recall was conducted.

Only 49 of the 50 illegal samples had sufficient amounts to be tested for microbial contaminants. Illegal cannabis samples were found to have significantly higher microbial contamination levels when compared to cannabis obtained from the legal market, often exceeding Ph. Eur. limits. For instance, 55% of illegal samples surpassed the total aerobic microbial count (TAMC) limit, with levels reaching up to 9 million colony forming units (CFU)/g, compared to only 6% of legal products. Total yeast and mold count (TYMC) and bile-tolerant Gram-negative bacteria (BTGN) also exceeded Ph. Eur. limits in 73% and 43% of illegal products, respectively. Additionally, contaminants such as *E. coli* and *Salmonella spp.* were only found in illegal products, and *Aspergillus spp*. appeared twice as frequently in illegal samples than in legal products.

Table 7: Microbial contaminants levels in legal and illegal dried cannabis

Contaminant	Ph. Eur. limit	Legal products		Illegal samples	
		> Ph. Eur. limit (%)	Range	> Ph. Eur. limit (%)	Range
Total aerobic microbial count (TAMC)	100,000 CFU/g	6	< 100,000 - 300,000 CFU/g	55	< 100,000 - 9,000,000 CFU/g
Total yeast and mold count (TYMC)	10,000 CFU/g	6	< 10,000 - 750,000 CFU/g	73	< 10,000 - 10,000,000 CFU/g
Bile-tolerant gram-negative bacteria (BTGN)	10,000 probable number of bacteria (PNB)/g	6	< 10 - > 10,000 PNB/g	43	< 10 - > 10,000 PNB/g
E-Coli	Absent	0	N/A	2	N/A
Salmonella spp.	Absent	0	N/A	2	N/A
Aspergillus spp.	N/A[γ]	14	N/A	37	N/A

[γ] There are no established tolerance limits for *Aspergillus spp.* in any publication found in Schedule B of the *Food and Drugs Act*.

The most commonly identified genus of bacteria included species of *Enterobacter, Pseudomonas* and *Pantoea*, with notable differences in their presence between legal and illegal samples, being more frequent in the illegal ones. *Enterobacter cloacae* was detected in 72% of illegal samples and is recognized in the literature as an opportunistic pathogen. Other bacteria, such as *Klebsiella spp.* and *Pseudomonas aeruginosa*, which are associated with respiratory infections, were also identified, predominantly in illegal samples.

Conclusion

The quality and safety of cannabis products can be influenced by various factors, including accurate labeling, changes in cannabinoid levels over time and the presence of contaminants. As the first extensive data gathering project of Health Canada's Cannabis Data Gathering Program, this survey represents an important step in understanding the composition of dried cannabis available in Canada. By analyzing legal and illegal dried cannabis samples, Health Canada has generated baseline data on total THC levels, heavy metals, mycotoxins, pesticide residues and microbial contaminants.

The results show significant differences between the total THC levels in legal dried cannabis products and the amounts stated on their labels. This suggests potential challenges for the legal industry related to accurate testing, representative sampling and product stability. As part of the Program, a stability study is underway to look at how total THC levels in dried cannabis products change over time. The results will be key to informing decision-making and guiding future regulatory updates.

Findings indicate that illegal cannabis generally contains higher levels of contaminants across most of the components tested. These results align with the Government of Canada's messaging, which encourages Canadians to choose legal cannabis to reduce risks associated with its use. For more information on the benefits of choosing legal cannabis and tips for identifying legal versus illegal products, visit Reduce your risk: Choose legal cannabis.

The unique findings of this study fill important data gaps regarding the composition and quality of dried cannabis that impact policies for cannabis regulation and Health Canada's understanding of the risks and harms of cannabis. The results underscore the value of the Program in supporting Health Canada's mandate to protect public health and safety. Findings from the survey can inform Health Canada's ongoing regulatory, compliance, inspection and surveillance efforts, as well as external organizations such as public health partners and law enforcement agencies. Some next steps regarding

this work include, among other things, characterizing the risks associated with the observed metals that were quantified above the USP limit.

Future Cannabis Data Gathering Program projects will continue to collect important data that will enhance Health Canada's ability to advise Canadians and promote safe, informed decisions related to cannabis use. Through continued monitoring and analysis, the Program aims to support regulation, mitigate health risks and strengthen consumer confidence in Canada's legal cannabis market.

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Appendix A: List of pesticide residues included in multi-residue method

A

Abamectin
Acephate
Acetamiprid
Acibenzolar-S-methyl
Afidopyropen
Alachlor
Aldicarb
Aldicarb sulfone
Aldicarb sulfoxide
Allethrin
Atrazine
Atrazine-desethyl
Azadirachtin
Azamethiphos
Azinphos-ethyl
Azinphos-methyl
Azoxystrobin

B

Beflubutamid
Benalaxyl
Bendiocarb
Benfluralin
Benfuracarb
Bensulide
Benthiavalicarb-isopropyl
Benzovindiflupyr
Bifenazate
Bifenox
Bifenthrin
Bixafen
Boscalid
Bromacil
Bromopropylate
Bromoxynil octanoate
Bromuconazole
Bupirimate
Buprofezin
Butachlor
Butralin
Butylate

C

Captan
Carbaryl
Carbetamide
Carbofuran
Carbophenothion
Carboxin
Carfentrazone-ethyl
Chlorantraniliprole
Chlordimeform
Chlorfenapyr
Chlorfenvinphos
Chlormephos
Chlorothalonil
Chlorphenapyr
Chlorpropham
Chlorpyrifos
Chlorpyrifos-methyl
Chlorthal-dimethyl
Clodinafop-propargyl
Clofentezine
Clomazone
Cloquintocet-mexyl
Clothianidin
Coumaphos
Crotoxyphos
Crufomate
Cyanazine
Cyanofenphos
Cyanophos
Cyantraniliprole
Cyazofamid
Cyclaniliprole
Cycloate

C

Cyflufenamid
Cyflumetofen
Cyfluthrin
Cyhalothrin-lambda
Cymoxanil
Cypermethrin
Cyphenothrin
Cyproconazole
Cyazofamid
Cyclaniliprole
Cycloate
Cyflufenamid
Cyflumetofen
Cyfluthrin
Cyhalothrin-lambda
Cymoxanil
Cypermethrin
Cyphenothrin
Cyproconazole

D

Deltamethrin
Demeton-O
Demeton-S
Demeton-S-methyl
Demeton-S-methyl sulfone
Desmedipham
Diazinon
Diazoxon
Dichlobenil
Dichlormid
Dichlorvos
Diclofop-methyl
Dicloran
Dicrotophos
Diethofencarb
Difenoconazole
Diflubenzuron
Dimethachlor
Dimethenamid
Dimethoate
Dimethomorph
Dimoxystrobin
Dinitramine
Dinotefuran
Diphenamid
Dipropetryn
Disulfoton
Disulfoton sulfone
Dithiopyr
Diuron
Dodemorph
Diphenamid
p,p’-Dicofol

E

Endosulfan-alpha
Endosulfan-beta
Endosulfan-sulfate
EPN
EPTC
Ethaboxam
Ethalfluralin
Ethion
Ethofumesate
Ethoprophos
Etofenprox
Etoxazole
Etridiazole

F

Famoxadone
Fenamiphos
Fenarimol
Fenbuconazole
Fenitrothion
Fenobucarb
Fenoxaprop-P-ethyl
Fenoxycarb
Fenpropathrin
Fenpropidin
Fenpyroximate
Fenson
Fenthion
Fenvalerate
Fipronil
Flamprop-isopropyl
Flamprop-M-methyl
Flonicamid
Florasulam
Fluazifop-P-butyl
Fludioxonil
Fluensulfone
Flufenacet
Flumetralin
Flumiclorac-pentyl-ester
Flumioxazin
Fluopicolide
Fluopyram
Fluorodifen
Fluoxastrobin
Flupyradifurone
Fluridone
Fluroxypyr-meptyl
Flusilazole
Flutianil
Flutriafol
Fluvalinate
Fluxapyroxad
Fomesafen

H

Halauxifen-methyl
Heptanofos
Hexazinone
Hexythiazox
3-Hydroxycarbofuran
S-Hydroprene

I

Imazalil
Imazamethabenz-methyl
Imidacloprid
Imiprothrin
Indaziflam
Indoxacarb
Inpyrfluxam
Ipconazole
Iprodione
Isofetamid
Isopyrazam
Isoxaben
Isoxaflutole

K

Kresoxim-methyl
S-Kinoprene

L

Lactofen
Linuron

M

Malaoxon
Malathion
Mandestrobin
Mandipropamid
Metalaxyl
Metazachlor
Metconazole
Methamidophos
Methidathion
Methiocarb
Methomyl
Methoxyfenozide

M

Metobromuron
Metolachlor
Metrafenone
Metribuzin
Momfluorothrin
Monocrotophos
Monolinuron
Myclobutanil

N

Napropamide
Nitrapyrin
Nitrothal-isopropyl
Norflurazon
Novaluron

O

n-Octyl bicycloheptene dicarboximide
Omethoate
Oxadiazon
Oxadixyl
Oxamyl
Oxathiapiprolin
Oxycarboxin
Oxyfluorfen

P

Paclobutrazol
Parathion-methyl
Pebulate
Penconazole
Pencycuron
Pendimethalin
Penflufen
Penthiopyrad
Permethrin
Pethoxamid
Phenmedipham
Phenothrin
Phenthoate
Phorate
Phorate sulfone
Phorate sulfoxide
Phosalone
Phosmet
Phosphamidon
Picolinafen
Picoxystrobin
Piperonyl butoxide
Pirimicarb
Pirimiphos-methyl
Prallethrin
Prochloraz
Procymidone
Prodiamine
Profenofos
Prometon
Prometryn
Propachlor
Propanil
Propargite
Propazine
Propetamphos
Propham
Propiconazole
Propoxur
Propyzamide
Prothiofos
Pydiflumetofen
Pyraclostrobin
Pyraflufen-ethyl
Pyrazon
Pyrazophos
Pyrethrins
Pyridaben
Pyrifenox
Pyrifluquinazon
Pyriofenone
Pyriproxyfen
Pyroxasulfone

Q

Quinalphos
Quintozene
Quizalofop-ethyl

R

Resmethrin
Rotenone

S

Sedaxane
Simazine
Spinosad (Total)
Spirodiclofen
Spiromesifen
Spirotetramat
Spiroxamine
Sulfentrazone
Sulfotep
Sulfoxaflor

T

TCMTB
Tebuconazole
Tebufenozide
Tebufenpyrad
Teflubenzuron
Tefluthrin
Terbacil
Terbufos
Terbumeton
Terbuthylazine
Terbutryn
Tetrachlorvinphos
Tetraconazole
Tetradifon
Tetramethrin
Tetraniliprole
Thiabendazole
Thiacloprid
Thiamethoxam
Thiobencarb
Thiodicarb
Thiofanox
Tiafenacil
Tioxazafen
Tolclophos-methyl
Tolpyralate
Tralkoxydim
Triadimefon
Triadimenol
Triallate
Triazophos
Tribufos
Trifloxystrobin
Trifludimoxazin
Triflumezopyrim
Triflumizole
Trifluralin
Triticonazole

V

Vinclozolin

Z

Zoxamide