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KNOWLEDGE SYNTHESIS
Cannabis Labelling and Accuracy

What is the issue?

One of the fundamental elements in establishing a safe legal cannabis system is quality control¹ and an important part of quality control is labeling. As laid out in *Packaging and Labelling Guide for Cannabis Products*, Canada's Cannabis Regulations have clear packaging and labelling requirements to protect consumers.² For example, packaging regulations include the requirement that a single package cannot exceed more than the equivalent of 30 grams (g) of dried cannabis or 1,000 milligram (mg) of tetrahydrocannabinol (THC).²

There are also a number of requirements regarding the labelling of cannabis products. The goal of labelling is to empower consumers by enabling them to make informed decisions (e.g., between products with differing levels of THC and/or cannabidiol [CBD]) and reduce the risk of adverse events (e.g., by identifying the level or dose of THC). Such information is not provided by illegal producers.

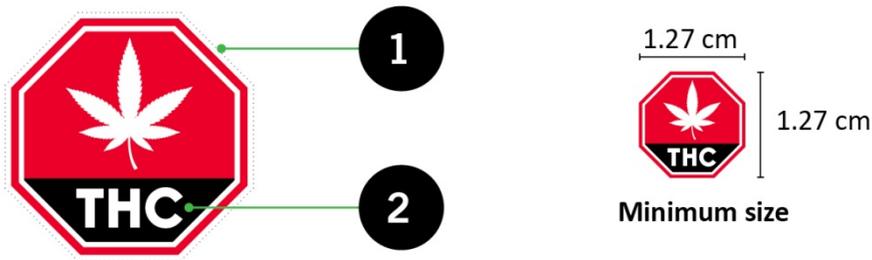
This rapid review will examine the following issues: 1) cannabis labelling requirements in Canada; 2) accuracy of the information in cannabis labels; and 3) consumer comprehension of cannabis labels.

1) Cannabis Labelling Requirements in Canada

Within Canada's *Cannabis Labelling Requirements* there are specific, mandatory guidelines for the packaging and labelling of cannabis products.²

- Each lot or batch of cannabis in its final form (either before or after packaging) must be tested by a licensed laboratory using validated methods for THC and its precursor tetrahydrocannabinolic acid (THCA), as well as CBD and its precursor cannabidiolic acid (CBDA). All final products must conform to the maximum amounts of THC and CBD allowed by product type (dried or fresh, extract, topical, or edible; see Table 1) and report their THC and/or CBD content. For amount of THC and CBD, there are acceptable tolerance levels according to the type of cannabis (see Table 2).
- All products must have fixed labels displaying the standardized cannabis symbol (see Figure 1) and the approved health warning message in both official languages, with attribution to Health Canada (Figure 2).
- Packaging must be opaque or translucent, be child resistant and have security features to ensure that the product has not been opened prior to purchase.
- Edible products must meet all appropriate food-safety guidelines and display required information (e.g., expiry or best before date, nutrition facts table, source of food allergens, gluten or added sulphites; for more information, see below).
- Other information about the product and the producer, as will be outlined below, must be displayed.

Figure 1 - Standardized cannabis symbol ¹



Colours



RED
 C0 M100 Y92 K0
 R235 G0 B41
 HTML EB0028
 PANTONE 185



BLACK
 C0 M0 Y0 K100
 R0 G0 B0



WHITE
 C0 M0 Y0 K0
 R255 G255 B255

Figure 2 – Canada health warning message with attribution ²

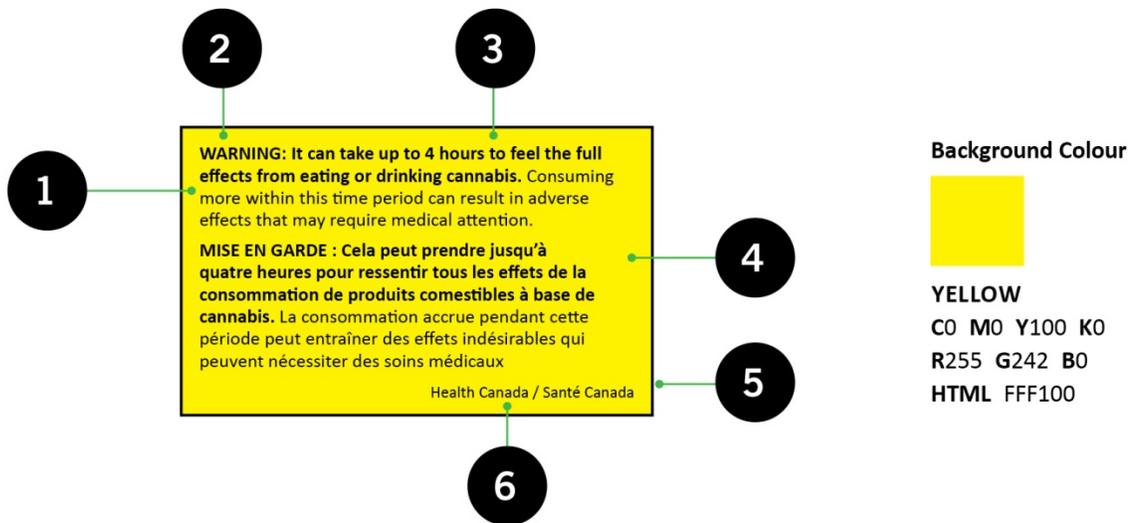


Table 1. Requirements for THC and CBD labelling by product type and mode of administration²

Type (Class) of Cannabis Product	Intended Mode of Administration	Labelling in Discrete Units	Labelling Not in Discrete Units
Dried or fresh cannabis	Inhalation	THC ## mg/g Total THC ## mg/g CBD ## mg/g Total CBD ## mg/g	THC ## mg/g Total THC ## mg/g CBD ## mg/g Total CBD ## mg/g
	Not for inhalation	THC per unit ## mg Total THC per unit ## mg CBD per unit ## mg Total CBD per unit ## mg	
Cannabis extracts	Inhalation	THC ## mg/g Total THC ## mg/g CBD ## mg/g Total CBD ## mg/g	THC ## mg/g Total THC ## mg/g CBD ## mg/g Total CBD ## mg/g
	Not for inhalation	THC per unit ## mg Total THC per unit ## mg CBD per unit ## mg Total CBD per unit ## mg	If intended for ingestion or rectal or vaginal use, or packaged with and is intended to dispense with extract: THC ## mg/g Total THC ## mg/g Total THC per activation ## mg CBD ## mg/g Total CBD ## mg/g Total CBD per activation ## mg
Cannabis topicals	Topicals (e.g., creams or oils) applied to the skin (i.e., not ingested or inhaled)	THC per unit ## mg or mg/g Total THC per unit ## mg or mg/g CBD per unit ## mg or mg/g Total CBD per unit ## mg or mg/g	THC ## mg or mg/g Total THC ## mg or mg/g CBD ## mg or mg/g Total CBD ## mg or mg/g
Edible cannabis	Cookies, candies, drinks and other edible food products (i.e., ingested)	THC per unit ## mg Total THC per unit ## mg THC ## mg Total THC ## mg CBD per unit ## mg Total CBD per unit ## mg CBD ## mg Total CBD ## mg	THC ## mg Total THC ## mg CBD ## mg Total CBD ## mg

Table 2: Tolerance Limits for the Net Weight and Volume Declared on Cannabis Product Labelling³

Type (Class) of Cannabis Product	Declared Net Weight in Grams or Net Volume in Grams or Millilitres	Tolerance in Percentage (%)	Tolerance in Grams or Millilitres
Dried or fresh	>0 to 2 grams	10%	
	>2	5%	
Edibles and topicals	>0 to 50	9%	-
	>50 to 100	-	4.5
	>100 to 200	4.5%	-
	>200 to 300	-	9
	>300 to 500	3%	-
	>500 to 1,000	-	15
	>1,000	1.5%	
Extracts	>0 to 2	10%	-
	>2 to 10	-	0.2
	>10 to 50	2%	-
	>50	-	1

Other information that must be reported about the product: ²

- Common name of the product or its function, as well as generic name or name of the cannabis product form (e.g., cream, drops, capsule, chocolate)
- Class of cannabis, as set out in Schedule 4 of the Cannabis Act (dried or fresh, extract, topical, or edible) and its intended use or mode of administration (e.g., inhalation, ingestion, for use on the skin)
- Lot number related to the manufacturing stage of the product
- Date on which the cannabis product was packed
- Expiry date (end date of the stability period for that cannabis product in at least month and year), or a statement that no expiry date has been determined
- For edible cannabis products that have a durable life date of 90 days or less, a “Best before” date in year-month-day format (year is optional)
- List of all ingredients and constituents and, if applicable, a nutrition facts table for edible products
- Net weight in grams, which must be within the tolerance limits set up in the document, *Tolerance Limits for the Net Weight and Volume Declared on Cannabis Product Labelling* (see Table 2)³
- Number of discrete units in the package and, if applicable, net weight per discrete unit
- A cannabis possession statements that explains the equivalent number of grams of dried cannabis represented by the products (in according with Schedule 3 of the Cannabis Act)
- Warning statement in upper case font and in both official languages: "KEEP OUT OF REACH OF CHILDREN / TENIR HORS DE LA PORTÉE DES ENFANTS"
- Recommended storage conditions (e.g., temperature, light, humidity)

Information about the producer that must be reported on the label: ²

- Contact information of the license holder, such as name, telephone number or email address

2) Accuracy of the information given in cannabis labels

As discussed in the previous section, licensed cannabis producers are obliged to provide fairly detailed information on the THC and/or CBD potency its products. However, despite these guidelines and the tolerance levels specified by Health Canada, the accuracy of cannabis labelling is an ongoing issue in Canada. For example, between October, 2018 and June 2020, Health Canada ordered 15 cannabis product recalls due to labelling errors.⁴ In 2020, a class-action lawsuit was filed against 15 Canadian cannabis producers charging that THC and/or CBD levels varied from those advertised on the product labels.⁵ At the same time, to date no empirical studies of labelling accuracy in Canada have been reported.

As well, it should be noted that current Canadian regulations do not require producers to display the results of other tests conducted as part of the quality assurance process (i.e., for other cannabinoids, pesticides, microbes, or residual solvents).

The problem of labeling inaccuracy is not unique to Canada. As outlined in Table 3, empirical studies on labelling accuracy have been conducted in a number of other jurisdictions.

Table 3: Published studies concerning the accuracy of labels on legal cannabinoid products

Type of Research	Type of Product	Jurisdictions	Main Findings
Systematic review of 5 studies ⁶	Medicinal cannabinoid product	U.S., Italy, Romania	5 studies of THC and/or CBD content demonstrated accuracy of labels ranged from 17% to 86%
Analysis of 75 samples ⁷	Medicinal edibles (baked goods, beverages, candy or chocolate)	California	THC content was accurate for only 17% and only 40% had detectable levels of CBD.
Analysis of 84 products ⁸	CBD extracts (oils, tinctures, or vaporization liquid)	Products sold online and purchased in U.S.	Only 26.1% had CBD content within 10% of its stated level, with 42.9% underlabelled and 26.1% overlabelled; in addition, in 21.4% there were also low levels of THC.
Analysis of 67 samples ⁹	Food products with CBD supplements (mostly CBD oils)	Germany	25% had THC levels above 2.5 mg/day (the lowest observed adverse effects level)
Analysis of 3 samples by a third-party lab ¹⁰	CBD level in hemp oil produced for the food industry	Products sold and purchased online	Two (66.7%) had CBD levels far below what was stated on the labels and one was up to 200% greater.

Labelling inaccuracies is particularly problematic for medicinal products. Those seeking the medicinal effects of CBD may be at risk of adverse effects if the CBD interacts with their other (e.g., prescription) medications or if there is unreported or underreported THC.¹¹

The case of cannabis edibles in Jamaica provides an interesting example of what can happen when labelling is not accurate. In 2015, Jamaica was the first Caribbean country to decriminalize cannabis and establish a medical cannabis industry. However, only two years later, after receiving reports of over-intoxication in adults and children, the sale of cannabis edibles was halted. A subsequent study of 45 edibles collected in Jamaica between 2014 and 2018 (i.e., before, during and after legalization), including baked goods, candies, frozen foods and beverages, found 86% failed to meet basic labelling requirements and that both THC and CBD levels ranged widely (between 0.01 to 99.9 mg per product for THC and from 0.001 to 69.2 mg for CBD). As well, 30% of the samples had THC levels greater than the recommended 10 mg THC per serving.¹²

What accounts for the poor accuracy of cannabis labelling? Causes probably vary between jurisdictions and have not been extensively investigated. A 2018 examination of labelling of legal cannabis in Washington state, for example, found significant and systematic differences between testing laboratories due to the lack of universal testing protocols.¹³

3) Consumer comprehension of cannabis labels

Labels are only effective if their meaning is clear to the reader. Issues of comprehension and efficacy of labels have been extensively studied in the food industry, where it is recognized that the information presented in labels – and how it is presented – can support both health promotion and product marketing.¹⁴

Focus testing conducted for Health Canada in 2020 found that while attitudes about cannabis are influenced primarily by family, friends and personal experiences, people want cannabis products to have clear warning labels that educate them on what is meant by a “recommended dose,” how to measure a recommended dose, and immediate risks and adverse effects (e.g., warnings not to drive).¹⁵ In theory, this sort of labelling should form part of the range of quality assurance activities necessary to promote consumer safety.¹

Clearly communicating cannabinoid levels and explaining what constitutes a “dose” can be difficult. This is particularly true given the range of cannabis products (plant, extract, topical, edible, etc.), the type of cannabinoid (THC or CBD), and its intended use (medicinal or recreational). In their research, Leos-Toroo et al. found that labelling the number of doses per package and using visuals (such as a traffic light system) were helpful.¹⁶ This finding was subsequently incorporated into Hammond’s five guidelines for THC labelling:¹⁷

- 1) The referent “standard dose” or “serving” should not exceed the amount that produces intoxication in the typical user
- 2) The THC content should be clearly stated in a user-friendly, comprehensible manner, which may include visuals to indicate the potency of a product
- 3) The standard dose should be explained as the volume or amount of product in the package
- 4) THC labelling should be reinforced by other packaging regulations (e.g., the number of doses or units in the package)
- 5) The label should provide a common basis for comparing between products

Health warnings have been an integral part of tobacco cessation efforts in many countries and have been found to increase knowledge, promote quit attempts, and contribute to decreased smoking consumption and prevalence.¹⁸ Should warnings be considered for cannabis product packaging? An online survey of 1,275 Canadian and 2,224 Americans from states in which cannabis is legal tested labels with warnings on six cognitive or physical harms: cannabis dependence or addiction, risk of driving while under the influence, harms associated with smoking, harms to the developing brain, decreased motivation, and negative effects on memory. With the exception of dependence, which was new to many respondents, most were aware of the risks and viewed them as believable. Higher frequency of cannabis use was associated with lower believability for the health message and lower likelihood for behaviour change. Overall, a third said that in theory, they were willing to consider reducing their cannabis use when confronted with health information on a cannabis product label, even though only a third of recent users supported cannabis labelling requirements.¹⁹

Conclusions

Labelling is a critical element of product quality control in a legal cannabis marketplace. Canada has a robust system of labelling requirements that should help to inform users of licensed cannabis products. However, even this system has its weaknesses. A small number of studies conducted around the world suggest that even in jurisdictions where cannabis has been legalized, inaccurate labelling may be a recurrent or even common problem. Poor labelling can be problematic, especially if the cannabis is being used for medicinal purposes by someone with an acute or chronic health condition. Issues that need to be monitored include the accuracy and reliability of testing and quality control processes, the type and range of information provided on labels, and the ability of the public to understand and apply this information.

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