

Keeping the High out of Hemp: Global THC Standards

[Samantha DeCarlo](#) and [Marin Weaver](#), Office of Industry and Competitiveness Analysis

As highlighted in the [“Grass’ Roots”](#) EBOT, hemp is reemerging as a legal—yet highly regulated—crop that can be produced commercially around the world and has a wide range of uses including fiber and food. As this EBOT highlights, one key regulation is the level of delta-9-tetrahydrocannabinol (THC)—the critical property distinguishing hemp from marijuana (both are forms of *Cannabis sativa* L.)—which is not harmonized across countries. A country’s allowable THC level for hemp has the ability to impact trade flows and competitiveness of some producing countries. Despite a lack of international standards, most countries are coalescing into one of two groups of low THC levels: 1) at or below 0.3 percent by dry weight or 2) at or below 1 percent by dry weight.

Global Hemp Cultivation: The number of countries producing hemp is increasing every year, and, as of May 2023, hemp cultivation appears to be occurring in most regions of the world. Researchers at Penn State estimated at least 30 countries permitted hemp production in 2018. By 2022, the UN estimated that at least 40 countries have “significant” production. This is a global trend. For example, as of 2019, reports estimated 12 African countries— including Malawi, South Africa, and Zimbabwe— had legalized hemp production and, in 2021, Thailand became the first Southeast Asian country to legalize it.

While hemp production is becoming more widespread, it is highly concentrated in China and Europe. USDA reported that over half of all hemp production was in China in 2019. A 2020 Australian government report estimated that about a quarter of total global hemp cultivation is in Europe, with France being the largest producer in the region. Although China, Europe, and Canada are identified as having mature hemp markets (i.e., more established supply chains), the rules for allowable THC level are still in flux across many markets as governments independently set or adjust maximum THC levels.

Picking a Low High for Hemp: The species *Cannabis sativa* L. (cannabis) yields both hemp and marijuana.¹ The two are distinguished by the level of detectable THC (by dry weight), the constituent compound present in cannabis that stimulates psychotropic effects (a “high”) in humans.² Hemp growers select seed and cultivars that limit the THC content within the plant; conversely, marijuana producers seek to maximize a plant’s THC level to produce a psychotropic effect. While THC level is crucial to defining hemp, there is no international standard on the allowable maximum THC level in hemp (table 1).

Table 1: Allowable maximum THC level for hemp (percent concentration), select countries

Other maximum THC levels (percentage)	THC at or below 0.3%	THC at or below 1%	
- Israel (0.2%)	- Canada	- Australia*	- New Zealand*
- United Kingdom (0.2%)	- China	- Columbia	- Peru
- Paraguay (below 0.5%)	- European Union (EU)	- Czechia	- Switzerland
- Ukraine (0.08%)	- Ghana	- Ecuador*	- Thailand
- South Africa (0.01%)*	- United States	- Lebanon	- Uruguay*
	- Zambia	- Mexico*	- Zimbabwe
		- Malawi	

Source: Compiled by authors.

Note: Starred countries have established different THC levels for products derived from the industrial hemp plant.

Despite the lack of an international standard, several countries have converged on national standards that set the allowable maximum THC level for hemp at or below either 0.3 percent or 1 percent THC content

¹ In this EBOT, “marijuana” covers all types of non-hemp *Cannabis sativa* L., including hashish and ganja.

² In 2017, the most popular strains of marijuana in the United States had a range of THC content from 17–28 percent.

(by dry weight). Currently, the United States, Canada, China, and the EU all legally define hemp as having a THC level below 0.3 percent. Collectively, these countries represent the largest share of hemp cultivation and likely trade.³ However, a large share of countries have adopted a 1 percent or lower THC level.

Maximum allowable THC levels are still in flux globally. For example, prior to 2023, in the EU a plant had to have a THC level below 0.2 percent to be hemp.⁴ Then in 2023, legislation went into effect raising the EU's THC level to below 0.3 percent, aligning the region with Canada, China, and the United States. Zimbabwe's maximum THC level for hemp was 0.3 percent until legislation passed in early 2023 raising the limit to 1 percent. These trends in legislation will likely continue beyond 2023. For instance, some in industry and government have expressed interest in increasing current allowable THC levels in the United States (to below 1 percent) and the United Kingdom (to below 0.3 percent).

Beyond the allowable THC level for the hemp plant itself, some countries have established different allowable THC levels for specific plant parts and/or end products. For example, in Australia and New Zealand, maximum THC levels are set as below 1 percent for industrial hemp (e.g., leaves, fibers, and flowers), at 2 percent for cannabidiols (CBD) extracts, and below 0.5 percent for hemp seed. Other countries, including Mexico and Uruguay, also set lower allowable THC levels for seed. In Ecuador, maximum THC levels are set as below 0.3 percent for hemp in processed foods and supplements and below 1 percent for certain products including CBD and other inputs for finished products.

Potential impacts of different THC limits: Differences in international regulations (e.g., maximum allowable THC levels) for hemp affect market access among countries, which subsequently impacts production and potentially trade flows. For instance, countries that permit THC levels at or below 1 percent may not be able to ship to markets with lower maximum THC levels, including the larger Canadian, Chinese, EU, and U.S. markets. Currently, the trade data available for certain fiber hemp intermediate products indicate that hemp trade is largely regional. The largest importing and exporting countries of these products have permissible THC levels set at or below 0.3 percent.

However, looking forward there are advantages at the farm level to having a higher allowable THC level. It may allow farmers to plant more hemp varieties. One article estimates that when the EU raised the maximum THC level in the EU to below 0.3 percent in 2023 (up from 0.2 percent maximum), farmers could gain access to hundreds of additional varieties of hemp plants for cultivation. In addition, higher allowable THC levels lessen the risk to farmers entering the hemp market. If the hemp crop exceeds the allowable THC level (i.e., goes "hot") the crop usually must be destroyed, which increases uncertainty of supply and, potentially, cost of production.

Sources: e.g., Šikić, "[Worldwide CBD Regulations 2021](#)," 10/11/21; USDA, AMS, [Hemp Production Program Questions and Answers](#), accessed 3/7/21; Sabaghi, "[European Union Increases THC Level](#)" 12/14/21; ICA Malawi, "[Learning Resources](#)," accessed 6/24/22; Wilson, *Hemp in Africa*, 3/21; Ukrainian Hemp, "[Industrial Hemp Stock](#)," accessed 3/7/23; UK Home Office, "[Drug Licensing Factsheet](#)," accessed 3/7/23; Pascual, *Cannabis in Latin America*, 2019; Canadian Government, "[Cannabidiol \(CBD\)](#)," 7/30/20; [Food Regulation 2015](#), as amended 7/1/22 and [Misuse of Drugs Act 1975](#), as amended 12/15/22 (New Zealand); WTO, [Standards and Safety](#), accessed 3/7/23; Penn State Extension, "[Industrial Hemp Production](#)," accessed 4/22/2022; Sumner, "[Aiming to Bring Africa's Abundant](#)," 8/7/19; Victoria State Government (Australia) and Industrial Hemp Taskforce (IHT) Victoria, [2020 Industrial Hemp Update](#), accessed 4/22/22; Hemp CBD, "[Africa Hemp Market](#)," 6/13/19; MMJ Daily, "[Zimbabwe sets cannabis THC](#)," 2/7/23; Prohibition Partners, "[The European CBD Market](#)," 2/9/23; Interviews with industry representatives and government officials, 8/4/22, 8/17/22; 8/18/22; S&P, GTA database accessed 5/25/22; from USDA, FAS., [Thailand: Industrial Hemp Report 2021](#) 4/4/21; [China: 2019 Hemp Annual Report](#), 2/27/20; [2021 Colombia Hemp Annual Report](#), 1/4/22.

³ Except for a couple fiber hemp products, most downstream hemp products fall into basket categories limiting the trade data available for hemp products.

⁴ Here the EU refers to the 27 members of the European Union as of January 1, 2022, except Czechia.