

Regulation on pesticide residues use and testing in cannabis and cannabis-based products in North and South America

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Introduction

Pesticides use during cannabis cultivation increase the likelihood of successful harvest significantly. However, they remain in the herbal material and are either inhaled together with their pyrolysis products formed as a result of high combustion temperatures (160-480°C) through smoking, vaping or dabbing using water/glass/paper pipes without filters. Alternatively, they are extracted/concentrated in cannabis-based products such as oils, waxes and cannabis-infused edibles.

The discrepancies in cannabis regulations disable establishment of strict worldwide and national regulations regarding pesticide use and mandatory testing. Instead, some of the countries and US states that legalized medicinal cannabis establish list of approved pesticides and testing lists of pesticides residues, but most of the countries remain in “regulatory silence”, such that no use of any available pesticide is illegal.

The aim of this review is to provide summary of the regulatory status of pesticide residues in cannabis and cannabis based products as potential risk for human health in North and South America

Pesticide use regulations in USA

According to EPA’s Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), for cannabis, which is classified as Schedule I controlled substance under the Controlled Substances Act, no use of registered pesticide is allowed and such would violate the federal law (7 U.S. Code Subchapter II - Environmental Pesticide Control, § 136-§ 136y, 2020). Out of the 33 states, two permanently

inhabited territories (Puerto Rico and Virginia Islands) and the District of Columbia legalized cannabis use for medical purposes and 11 states and two permanently inhabited territories (Northern Mariana Islands and Guam) legalized both recreational and medical use. Of them, only 22 states have adopted policies or rules governing pesticide use in cannabis cultivation and pesticide residue testing.

Tested pesticides are selected according to their general (human) toxicity, availability, analytical amenability and detection frequency in cannabis. Other states use already established lists; e.g. Massachusetts tests for prohibited pesticides identified by AHP (Upton et al., 2013), New Jersey’s selection is based on the EPA pesticide testing method 507 (Determination of Nitrogen and Phosphorous-Containing Pesticides in Water by Gas Chromatography with a Nitrogen-Phosphorus Detector, 1995), while New York requires testing on any pesticide/growth regulator that can be used.

Allowed levels of pesticide residues are state-specific. Five states (Connecticut, Illinois, Louisiana, Ohio and Nevada) allow presence of any federally registered pesticide up to a level lower than the lowest legal pesticide residue in any food item as set forth in Subpart C 40 CFR 180 (40 CFR Subpart C - Specific Tolerances, 2022). In California, residue limits for cannabis are based on guidance residue levels (GRLs) published for tobacco by the French agency CORESTA in 2016 (Bureau of Cannabis Control Text of Regulations, California Code of Regulations Title 16, 2018). In Oregon, action levels are based on method’s limits of quantification (LOQs), set to 0.1 mg/kg for all tested pesticides or arbitrary to 0.01 mg/kg in New Hampshire and 1 mg/kg in Hawaii. In Washington, action levels for all pesticides not allowed is 0.1 mg/kg (Chapter 314-55 WAC. Marijuana Licenses,

Application Process, Requirements and Reporting, 2018). For many other states, methodology of action limit determination is unknown (Arkansas, Michigan, Ohio, Oklahoma etc.).

Pesticides regulations in Canada

According to Marijuana for Medical Purposes Regulations (MMPR) of Canada, only the 28 pest control products approved by The Pest Management Regulatory Agency (PMRA) can be used during medical cannabis cultivation (Pest Control Product Act, 2020). Health Canada implemented mandatory cannabis testing for 96 pesticides in all cannabis products: cannabis (indoor, outdoor, fresh and dried plants and seeds), cannabis oils, edibles and any industrial hemp-derived products before sold on the market, for every production batch, either on the final form or at the final step of production process during which the contaminants could be concentrated (i.e. on the “input” cannabis, cannabis extract infused in cannabis topical formulations) (Canada & Health Canada, 2019). The list includes pesticides that are part of historical and/or current pesticide residues used in Canada and: were detected on cannabis in Canada or US states that have regulated its production; are used against pests that can be found on *C. sativa*; were observed by inspectors of Health Canada or the Canada Border Services Agency or were identified because of the risk of health or the environment or other factors.

Pesticides regulations in South America

Latin America is currently the world’s leader in promotion and adoption of policies allowing access to cannabis for therapeutic uses (Aguilar et al., 2018). In 2014, **Uruguay** became the first country in the world to legalize cannabis cultivation and use for medical, recreational, industrial and scientific purposes. **Brazil** legalizes medical cannabis only for terminally ill and patients that have exhausted other treatment options (*Senado Federal, Projeto de Lei N.5295*, n.d.), while Peru (Bedoya, n.d.), **Chile** (Ley No 20.000, 2021), **Mexico** (Ley general de salud, 2022) and **Columbia** (Ley 1787 de 2016, 2016) regulate medical and scientific access to cannabis. However, no data is available regarding pesticide use and testing regulations in any of the aforementioned countries. Only Columbia’s Resolution 1816 (Resolución 1816, 2016) requires measurement of “pesticide residues that the raw material can have”, but without explicit details.

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