

Cannabis

A rapidly expanding analytical field

Agilent solutions are at the forefront of research and analytical screening efforts to accurately quantify medicinal and recreational cannabis. States that have passed laws permitting usage of medicinal and recreational marijuana are now requiring rigorous testing of cannabis for quantification of contaminants.

From routine analysis to cutting edge research, Agilent's portfolio of solutions work together seamlessly for maximum efficiency and performance.



The capacity for retention of pesticides in cannabis crops is high. It is therefore crucial that analytical monitoring of pesticide levels in cannabis takes place in order to guarantee consumer safety and improve testing standards for regulatory bodies.¹

Pesticides

Mass Spectrometry

Sample Preparation:

- Enhanced Matrix Removal—Lipid
- QuEChERS and dSPE

Software:

- MassHunter

Instrumentation:

- 7000 Series Triple Quadrupole GC/MS
- 6400 Series Triple Quadrupole LC/MS
- 6500 Series Accurate-Mass Quadrupole Q-TOF LC/MS
- GC/MS/MS Pesticides ANALYZER



Potency

Potency comes as a result of cannabinoids. Approximately 120 plant derived cannabinoids have been identified, most notably:

- Tetrahydrocannabinol (THC), the psychoactive component
- Cannabidiol (CBD), the non-psychoactive component exhibiting medicinal properties²

Terpenes

Terpenes are attributed to the flavor and fragrance of cannabis. Medicinally, these are being investigated and proved to act in synergy with cannabinoids when treating conditions such as inflammation, depression, anxiety, epilepsy and cancer, as well as showing activity as a fungicide and bactericide.

Terpenes have also been used as a means of more accurately identifying particular strains biologically, rather than through variable nomenclature.^{5,6}

Molecular Spectroscopy

Instrumentation:

Cary 630 FTIR

Software:

- MicroLab PC

Liquid and Gas Chromatography

Instrumentation:

- Intuvo 9000 GC
- 5977B GC/MSD
- 1290 Infinity II LC
- 1290 Infinity II 2D-LC Solution
- 1260 Infinity II SFC System

Software:

- MassHunter

Molecular Spectroscopy

Instrumentation:

Cary 630 FTIR

Software:

- MicroLab PC

Liquid and Gas Chromatography

Instrumentation:

- Intuvo 9000 GC
- 7890 Series GC with FID
- 1260 Infinity II Diode Array Detector

Software:

- MassHunter

Heavy Metals

Soil contamination with heavy metals such as arsenic, lead and mercury, is a concern in all crop growth and poses severe danger to human health. Cannabis in particular accumulates heavy metals and must be tightly monitored.^{3,4}

Residual Solvents

Cannabis concentrates and extracts can be obtained from the plant using solvents. These must be tested to ensure solvent levels do not exceed levels deemed to be harmful to consumers health.⁷

Atomic Spectroscopy

Software:

- ICP-MS MassHunter
- ICP-MS Expert

Instrumentation:

- 5110 ICP-OES
- 7800/7900 ICP-MS
- 8900 Triple Quadrupole ICP-MS

Gas Chromatography

Instrumentation:

- 7890 Series GC with 7697A Headspace Sampler and Flame Ionization Detector

Software:

- MassHunter • OpenLab CDS

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Agilent products and solutions are intended to be used for cannabis quality control and safety testing in laboratories where such use is permitted under state/country law.

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2. Morales, Paula et al. Molecular Targets of the Phytocannabinoids - A Complex Picture. *Progress in the Chemistry of Organic Natural Products* 2017, 103: 103-131
3. Tangahu, Bieby et al. A Review on Heavy Metals (As, Pb and Hg) Uptake by Plants through Phytoremediation. *International Journal of Chemical Engineering* 939161, 2011: 31
4. McPartland, John et al. Contaminants of Concern in Cannabis: Microbes, Heavy Metals and Pesticides. *Botany and Biotechnology* 2017: 457-474

5. Russo, Ethan. Taming THC: potential cannabis synergy and phytocannabinoid-terpenoid entourage effects. *British Journal of Pharmacology* 2011; 163(7): 1344-1364
6. Fischechick, Justin. Identification of Terpene Chemotypes Among High (-)-trans- Δ^9 -Tetrahydrocannabinol-Producing Cannabis sativa L. Cultivars. *Cannabis and Cannabinoid Research* 2017; 2(1): 34-47
7. Farrer, David. Technical Report: Oregon Health Authority's Process to Determine Which Types of Contaminants to Test for in Cannabis Products and Levels for Action. 2015



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Trusted Answers