

Supplementary Material S1. Non-neurological quantifying conditions for medical use of cannabis in 30 states and Washington, D.C.

Other Qualifying conditions	Number of Jurisdictions /31:
Other:	31
Admittance to Hospice Care	3
AIDS	29
Any other disability	3
Autoimmune Disease	1
Cancer	29
Chronic Pancreatitis	1
Chronic Renal Failure Requiring Hemodialysis.	1
Colitis	1
Crohn's Disease	21
Cystic Fibrosis	1
Decompensated Cirrhosis	1
Ehlers-Danlos Syndrome	3
Fibrous Dysplasia	1
Glaucoma	27
Hepatitis C	12
HIV	29
Hydrocephalus	2
Hydromyelia	1
IBS	7
Inclusion Body Myositis	1
Lupus	3
MALS	1
Muscular Dystrophy	5
Nail Patella	2
Neuro-Behcet's Autoimmune Disease (searched Behcet Syndrome)	1
Osteoarthritis	1
Osteogenesis Imperfecta	1
Polycystic Kidney Disease (PKD)	1
Post Herpetic Neuralgia	1
Rare condition or disease that affects less than 200,000 individuals in the U.S., as defined in federal law and this is not adequately managed despite treatment attempts using conventional medications (other than opioids or opiates) or physical interventions	1
Severe Arthritis/ Rheumatoid	7
Severe Psoriasis and Psoriatic Arthritis	1
Sickle Cell Anemia	5
Sjogren's Syndrome	1
Superior Canal Dehiscence Syndrome	1
Terminal Illness	10
Ulcerative Colitis	7

Supplemental Material S2. References with quantified results of pesticide residue testing on cannabis plant matter in the open literature

We searched the open literature on PubMed for papers with quantified results of pesticide residue testing on cannabis plant matter. There were 6 different papers with testing data on cannabis plants that were found through searching “cannabis contaminants” and subsequent searches combining “cannabis” with chemical terms on the PubMed database [1-6]. One paper was also found through a reference in a review paper on PubMed, though the paper itself was not on PubMed[7]. Two other papers came from previous research done on the subject [8, 9]. Of those 9 total papers, 7 of them contained quantifications of specific residues by weight. Most of the pesticide residue testing in those studies were done in cannabis plant matter, so any results from concentrates were excluded in our analysis. Sixteen of the top 50 chemicals had quantified residues found on cannabis shown in figure 3. Nine of these values were found in legal samples from the United States of America, while the other 7 were found in illegal cannabis from 3 different countries.

CASRN	Chemical Name	Highest Value (ppb)	Ref.	Highest legal USA value (ppb)	Ref.
138261-41-3	Imidacloprid	64000	[7]	64000	[7]
11141-17-6	Azadirachtin	36000	[7]	36000	[7]
51-03-6	Piperonyl butoxide	22700	[7]	22700	[7]
62-73-7	Dichlorvos	8058	[7]	8058	[7]
88671-89-0	Myclobutanil	8039	[7]	8039	[7]
82657-04-3	Bifenthrin	60000	[8]	5621	[7]
71751-41-2	Abamectin/Avermectin	1000	[7]	1000	[7]
168316-95-8	Spinosad/ Spinosyn A/D (added)	1000	[1]	1000	[1]
134-62-3	Diethyltoluamide/DEET	880	[1]	880	[1]
40487-42-1	Pendimethalin	380	[1]	380	[1]
121-75-5	Malathion	300	[7]	300	[7]
658066-35-4	Fluopyram	140	[1]	140	[1]
52645-53-1	Permethrin	130	[7]	130	[7]
63-25-2	Carbaryl	110	[7]	110	[7]
76738-62-0	Paclobutrazol	100	[7]	100	[7]
333-41-5	Diazinon	70	[7]	70	[7]
56-72-4	Coumaphos	40	[7]	40	[7]
149877-41-8	Bifenazate	600	[4]	30	[7]
114-26-1	Propoxur	30	[7]	30	[7]
4685-14-7	Paraquat	25100000	[3]		
107534-96-3	Tebuconazole	800000	[8]		

1071-83-6	Glyphosate	750000	[3]		
60207-90-1	Propiconazole	80000	[8]		
731-27-1	Tolylfluanid/DMST	53000	[8]		
24579-73-5	Propamocarb	9800	[8]		
78587-05-0	Hexythiazox	460	[8]		
57837-19-1	Metalaxyl	23	[6]		
67129-08-2	Metazachlor	22.6	[6]		
188425-85-6	Boscalid	10	[4]		
175013-18-0	Pyraclostrobin	10	[4]		
953030-84-7	Buprofezin	6.6	[6]		

1. Maguire, W.J., et al., *Comprehensive Determination of Unregulated Pesticide Residues in Oregon Cannabis Flower by Liquid Chromatography Paired with Triple Quadrupole Mass Spectrometry and Gas Chromatography Paired with Triple Quadrupole Mass Spectrometry*. J Agric Food Chem, 2019. **67**(46): p. 12670-12674.
2. Fucci, N., *Growing cannabis with naphthalene in Rome*. Forensic Sci Int, 2003. **138**(1-3): p. 91-3.
3. Lanaro, R., et al., *Determination of herbicides paraquat, glyphosate, and aminomethylphosphonic acid in marijuana samples by capillary electrophoresis*. J Forensic Sci, 2015. **60 Suppl 1**: p. S241-7.
4. Moulins, J.R., et al., *Multiresidue Method of Analysis of Pesticides in Medical Cannabis*. J AOAC Int, 2018. **101**(6): p. 1948-1960.
5. Cuypers, E., et al., *The use of pesticides in Belgian illicit indoor cannabis plantations*. Forensic Sci Int, 2017. **277**: p. 59-65.
6. Daniel, D., F.S. Lopes, and C.L. do Lago, *A sensitive multiresidue method for the determination of pesticides in marijuana by liquid chromatography-tandem mass spectrometry*. J Chromatogr A, 2019. **1603**: p. 231-239.
7. Voelker, R. and M. Holmes, *Pesticide use on cannabis*. Cannabis Safety Institute, 2015: p. 1-19.
8. Schneider, S., R. Bebing, and C. Dauberschmidt, *Detection of pesticides in seized illegal cannabis plants*. Analytical Methods, 2014. **6**(2): p. 515-520.
9. Dahl, J., et al., *LCMS-8040 Application Pesticides in Cannabis*. Undated, Shimadzu Scientific Instruments: Columbia, Maryland. p. 8. Table 4.

Supplemental Material S4. Gene connections to insecticides, cannabinoids, and epilepsy across key biological functions related to seizure in the Comparative Toxicogenomics Database

	Insecticide	Cannabinoid	Epilepsy
Neuroactive ligand-receptor interaction			
Cholinergic synaptic signaling	ACHE, CHAT, CHRM1, CHRNA3, CHRNA4, and CHRNA7	KCNQ2	CHRNA4, KCNQ1, KCNQ2, and KCNQ3
Dopaminergic synaptic signaling	DRD1, DRD2, and DRD3	DRD1 and DRD2	GRIN2A, GRIN2B, and SCN1A
Retrograde endocannabinoid signaling	CNR1 and FAAH	CNR1	None
GABAergic synaptic signaling	ABAT	None	GABRA1, GABRB3, and GABRG2
MAPK signaling pathway	BDNF, FGF2, FOS, IL1B, and NGF	FOS, IL1B, and NGF	CACNA1H
PI3K-Akt signaling pathway	IFNB1, IL6, INS1, NGFR, and TSC2	IL6	None
Neuropeptide hormone activity	ADCYAP1, CCK, CRH, NPY, OXT, POMC, and TRH	CCK, CRH, OXT, and POMC	None
Oxidation-reduction process	CAT, CYP11A1, NOS1, NOS2, PAM, PTGS2, and SOD2	CAT, NOS1, NOS2, PTGS2, and SOD2	None
ABC and SLC transporters	ABCB1A, ABCC2, SLC2A1, SLC6A2, SLC8A3, and SLC30A1	ABCB1A and SLC6A1	SLC2A1 and SLC6A1