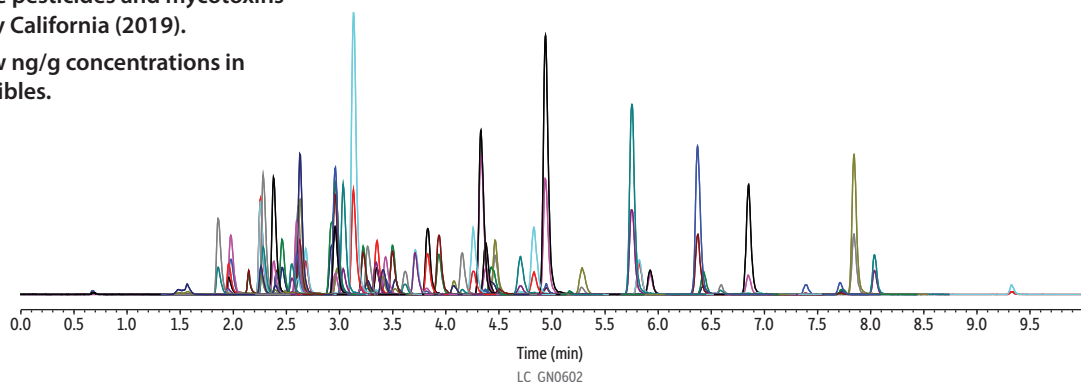


# California Cannabis Pesticides and Mycotoxins in Brownies on Raptor ARC-18

- LC amenable pesticides and mycotoxins regulated by California (2019).
- Quantify low ng/g concentrations in cannabis edibles.



Peaks	tr (min)	Precursor Ion	Product Ion 1	Product Ion 2	Polarity	Peaks	tr (min)	Precursor Ion	Product Ion 1	Product Ion 2	Polarity
1. Daminozide-d6	0.6	167.0	149.3	49.3	+	44. Bifenazate	3.4	301.0	198.1	170.2	+
2. Daminozide	0.7	161.1	44.1	143.2	+	45. Ochratoxin A	3.5	404.2	239.1	358.3	+
3. Acephate	1.5	184.0	143.1	95.1	+	46. Fenhexamid	3.5	302.1	97.1	55.2	+
4. Oxamyl	1.8	237.1	72.1	90.1	+	47. Spirotetramat	3.7	374.2	302.1	216.1	+
5. Flonicamid	1.9	230.1	203.1	174.1	+	48. Ethoprophos	3.8	243.1	131.1	97.1	+
6. Methomyl	1.9	163.1	88.1	106.1	+	49. Fipronil	3.8	436.8	331.8	251.9	-
7. Thiamethoxam	1.9	292.0	211.1	181.1	+	50. Fenoxycarb	3.9	302.1	88.1	116.1	+
8. Imidacloprid	2.2	256.1	209.1	175.1	+	51. Kresoxim-methyl	4.1	314.2	267.2	222.2	+
9. Mevinphos I	2.2	225.1	127.1	193.2	+	52. Tebuconazole	4.2	308.1	70.1	125.1	+
10. Acetamiprid	2.2	223.0	126.1	56.1	+	53. Diazinon-d10	4.2	315.2	170.2	-	+
11. Dimethoate-d6	2.2	236.1	205.1	-	+	54. Spinosyn A (spinosad)	4.3	732.4	142.2	98.1	+
12. Dimethoate	2.3	230.0	199.1	125.1	+	55. Diazinon	4.3	305.1	169.2	153.2	+
13. Thiacloprid	2.4	253.0	126.0	90.1	+	56. Coumaphos	4.4	363.1	227.1	307.1	+
14. Mevinphos II	2.4	225.1	127.1	193.2	+	57. Pyridaben	4.4	365.1	309.2	147.2	+
15. Aflatoxin G2	2.4	331.2	189.3	115.2	+	58. Propiconazole	4.4	342.0	159.0	69.2	+
16. Aflatoxin G1	2.4	329.2	243.2	215.3	+	59. Clofentazine	4.5	303.0	138.1	102.1	+
17. Aldicarb	2.5	116.0	89.2	70.2	+	60. Spinosyn D (spinosad)	4.8	746.5	142.3	98.4	+
18. Aflatoxin B2	2.5	315.3	287.2	243.3	+	61. Spinosyn J (spinetoram)	4.8	748.5	142.3	98.3	+
19. Dichlorvos	2.6	220.9	109.1	79.2	+	62. Trifloxystrobin	4.9	409.2	186.1	145.1	+
20. Dichlorvos-d6	2.6	227.0	115.1	-	+	63. Prallethrin	4.9	301.2	123.2	105.2	+
21. Aflatoxin B1	2.6	313.2	241.2	128.2	+	64. Pyrethrin II	5.2	373.1	161.1	133.2	+
22. Imazalil	2.6	297.0	159.0	201.0	+	65. Spinosyn L (spinetoram)	5.4	760.5	142.2	98.1	+
23. Carbofuran	2.6	222.1	123.1	165.2	+	66. Piperonyl butoxide	5.7	356.3	177.2	119.2	+
24. Propoxur	2.6	210.1	111.1	93.1	+	67. Chlorpyrifos	5.8	349.9	198.0	97.1	+
25. Carbaryl-d7	2.7	209.2	152.2	-	+	68. Hexythiazox	5.9	353.1	228.1	168.1	+
26. Carbaryl	2.7	202.1	145.1	127.1	+	69. Etoxazole	6.4	360.2	141.1	304.2	+
27. Diuron-d6	2.9	239.1	78.2	-	+	70. Spiromesifen	6.4	273.2	255.2	187.2	+
28. Atrazine-d5	2.9	221.2	179.1	-	+	71. Pyrethrin I	6.6	329.2	161.2	105.2	+
29. Naled	2.9	397.8	127.1	109.1	+	72. Cyfluthrin (qualifier)	6.6	453.1	193.2	-	+
30. Metalaxyl	2.9	280.2	220.2	192.2	+	73. Cyfluthrin	6.6	451.1	191.2	-	+
31. Spiroxamine	2.9	298.3	144.2	100.2	+	74. Cypermethrin	6.8	433.1	191.0	416.0	+
32. Chlorantraniliprole	3.0	483.9	452.9	285.9	+	75. Fenpyroximate	6.8	422.2	366.1	138.1	+
33. Phosmet	3.0	318.0	160.1	77.2	+	76. trans-Permethrin	7.4	408.3	183.2	355.1	+
34. Azoxystrobin	3.1	404.0	372.1	344.1	+	77. cis-Permethrin	7.7	408.3	183.2	355.1	+
35. Linuron-d6	3.1	255.1	160.1	-	-	78. Avermectin B1a	7.7	890.5	305.4	567.4	+
36. Fludioxonil	3.2	247.0	180.0	126.0	-	79. Etofenprox	7.8	394.3	177.2	359.3	+
37. Methiocarb	3.2	226.1	169.1	121.1	+	80. Bifenthrin	8.0	440.0	181.2	166.2	+
38. Dimethomorph I	3.2	388.2	301.2	165.3	+	81. Acequinocyl					
39. Boscalid	3.2	342.9	307.1	140.1	+	(precursor ion 1)	9.3	402.3	343.2	189.0	+
40. Paclobutrazol	3.3	294.3	70.1	125.1	+	82. Acequinocyl					
41. Malathion	3.3	331.0	127.2	285.2	+	(precursor ion 2)	9.3	386.0	344.2	189.1	+
42. Dimethomorph II	3.4	388.2	301.2	165.3	+						
43. Myclobutanil	3.4	289.1	70.1	125.1	+						

**Column:** Raptor ARC-18 (cat.# 9314A12)  
**Dimensions:** 100 mm x 2.1 mm ID  
**Particle Size:** 2.7 µm  
**Pore Size:** 90 Å  
**Guard Column:** Raptor ARC-18 EXP guard column cartridge 5 mm, 2.1 mm ID, 2.7 µm (cat.# 9314A0252)  
**Temp.:** 40 °C  
**Sample:** California pesticide standard #1 (cat.# 34124)  
 California pesticide standard #2 (cat.# 34125)  
 California pesticide standard #3 (cat.# 34126)  
 California pesticide standard #4 (cat.# 34127)  
 California pesticide standard #5 (cat.# 34128)  
 California pesticide standard #6 (cat.# 34129)  
 Dimethoate-d6 (cat.# 31988)  
 Dichlorvos-d6 (cat.# 31987)  
 Carbaryl-d7 (cat.# 31985)  
 Diazinon-d10 (cat.# 31986)  
 Atrazine-d5 (cat.# 31984)  
 Diuron-d6 (cat.# 31989)  
 Liuron-d6 (cat.# 31990)  
 Aflatoxins standard (cat.# 34121)  
 Ochratoxin A (cat.# 34122)  
 Compounds not present in these mixes were obtained separately.

**Diluent:** 75:25 Acetonitrile:water  
**Conc.:** 5-15 ng/mL (Expected concentration range in extract of brownie initially spiked at 100 ng/g.)  
**Inj. Vol.:** 2 µL  
**Mobile Phase**  
**A:** Water, 2 mM ammonium formate, 0.1% formic acid  
**B:** Methanol, 2 mM ammonium formate, 0.1% formic acid

Time (min)	Flow (mL/min)	%A	%B
0.00	0.5	95	5
1.5	0.5	35	65
8.5	0.5	5	95
9.5	0.5	0	100
10.5	0.5	0	100
10.6	0.5	95	5
12	0.5	95	5

**Detector:** MS/MS  
**Ion Mode:** ESI+/ESI-  
**Mode:** MRM  
**Instrument:** UHPLC

**Notes:** Brownies were pulverized using a SPEX Freezer/Mill grinder and 0.5 g samples were fortified with pesticides and mycotoxins at 100 ng/g. A mix of internal standards was added at 200 ng/g. 1.5 mL of acetonitrile acidified with 1% acetic acid was added to the sample. The sample was vortexed and sonicated for 5 min, and then the supernatant was passed through a 100 mg Resprep C18 SPE cartridge (cat.# 26030). An additional 1.5 mL of extraction solvent (acidified acetonitrile) was added to the sample pellet, and then the sample was vortexed again. The supernatant was passed through the same C18 cartridge. 750 µL of extract was mixed with 250 µL of water, and then centrifuged for 5 min at low temperature (~7 °C). 2 µL of final extract was injected into the LC-MS/MS system.