Understanding Lab Testing

Presented By:

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374 Labs

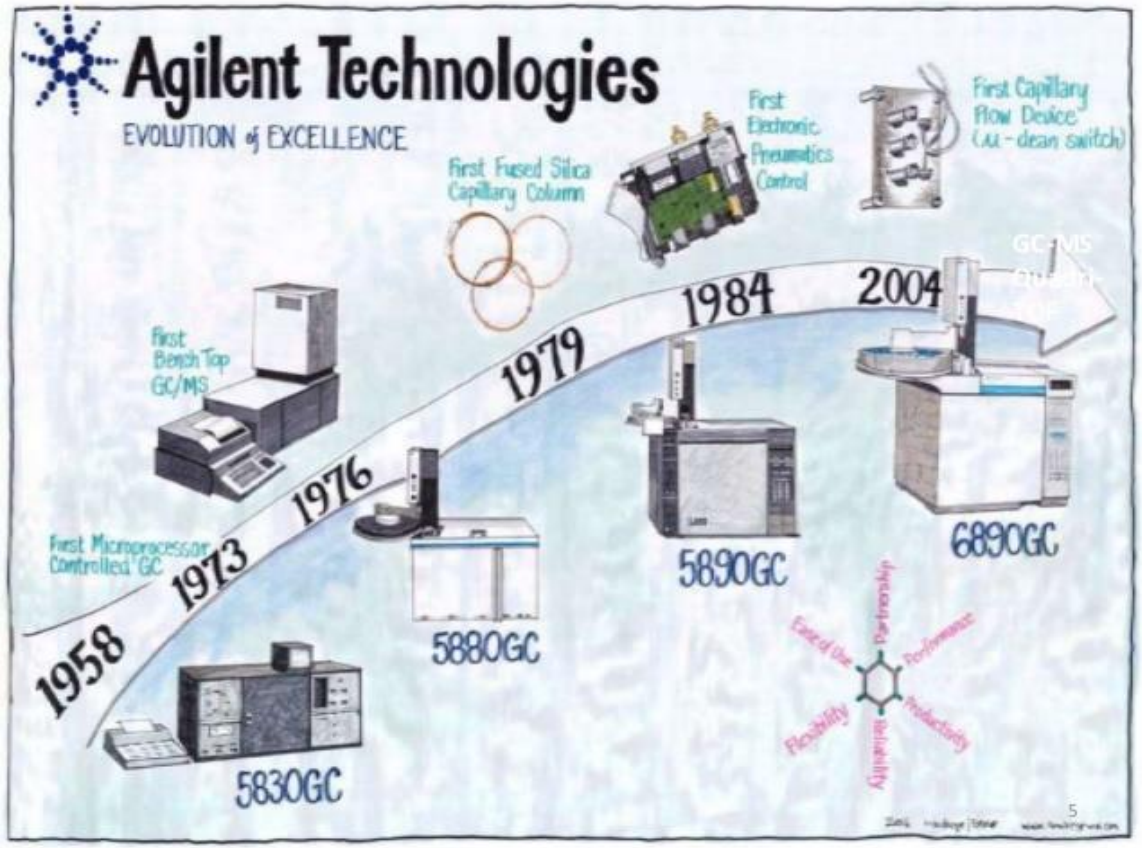
Topics of Discussion

- Evolution of cannabis testing
- Lab Testing 101: What labs test for
- Nevada as an industry leader
- What goes into testing a sample
- How to read a lab report and what the numbers mean
- Q&A

Testing Perception vs Reality

Evolution of Cannabis Testing

- No testing
- Testing for cannabinoids/potency
- Testing for terpenes
- Testing for contaminants



What do Labs Test For?

- These requirements can vary from State to State, Nevada currently tests for the following:
  - Cannabinoids
  - Terpenes
  - Microbial
  - Heavy Metals
  - Pesticides
  - Mycotoxins
  - Moisture Content/Water Activity
  - Residual Solvents

Nevada a Regulatory Leader

Differing trajectories, similar targets

	Colorado	Nevada	Oregon	Washington	California
Personal Cultivation Legalized	**2000**	**2000**	**1998**	**1998**	**1996**
Commercial Cultivation Legalized (Rec)	**2012**	**2017**	**2014**	**2012**	**2018**

- One of the first states to develop comprehensive testing standards for cannabis.
- Nevada has become a model for other states legalizing marijuana
  - Pesticide Testing
  - Heavy Metals
  - Mycotoxins

Lab Equipment

- LC-MS/MS
- GC-MS/MS
- GC-FID
- GC-MS
- HPLC
- ICP-MS (Inductively coupled plasma mass spectrometry)
- Graphite furnace atomic absorption spectroscopy
- PCR (Polymerase chain reaction)
- Moisture Balance and Water Activity Meter

Nevada Testing Process

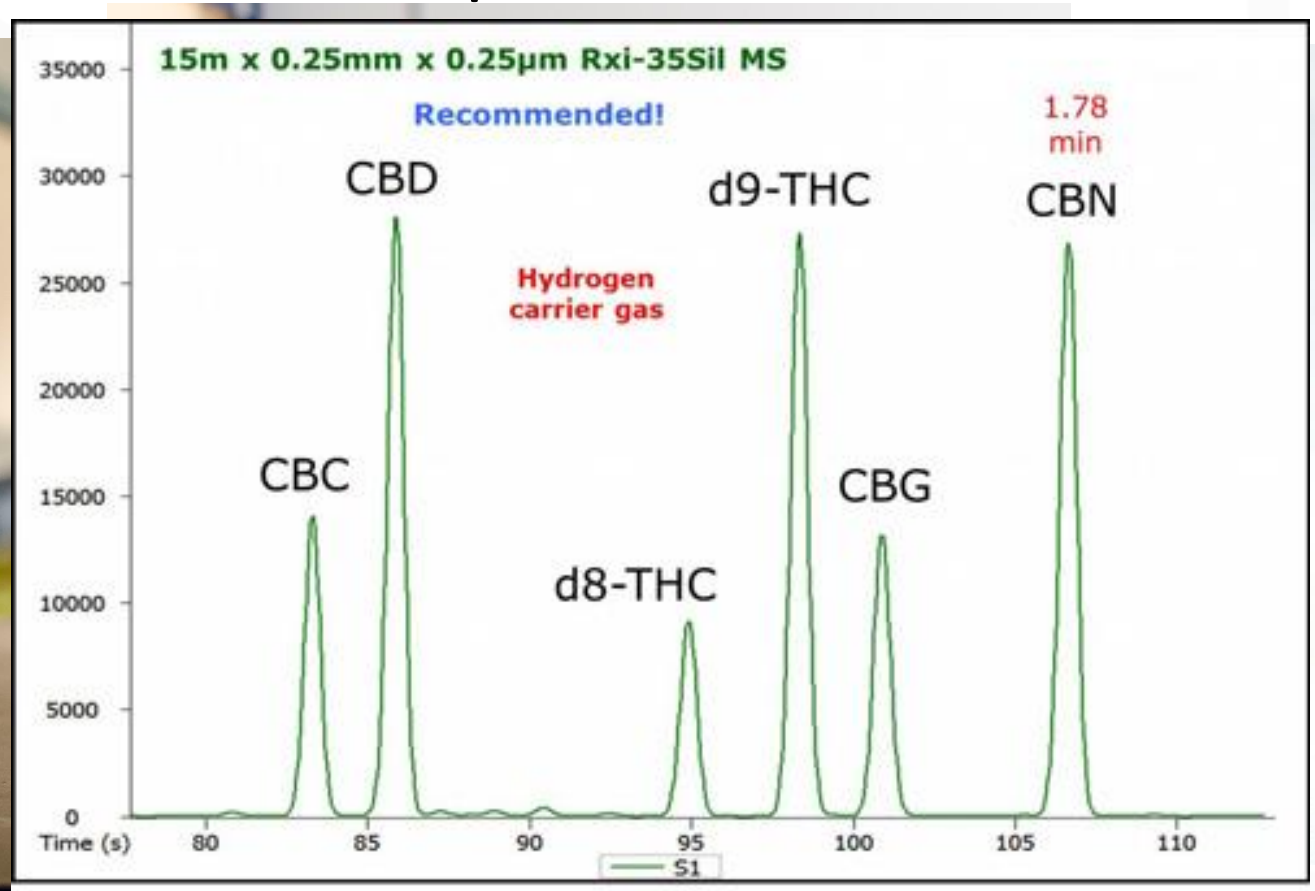
- Cultivator or Producer creates a lot of flower, oil or edibles
- Lab is notified, Lab goes to collect a sample from the lot or production run for testing
- Sample is tagged in Metrc and taken back to the lab for analysis

metrc™

Nevada Testing Process Continued

- Sample is received at the laboratory and testing process begins
- Sample is homogenized and prepped for different assays and run on corresponding instruments
- Data is reviewed and uploaded to LIMS
- Reports sent to customer, State and Metrc
- Cultivator/Producers can now sell the product with a passing report
- Failed product is not available for retail sale

Cannabinoids Soup to Nuts



15m x 0.25mm x 0.25µm Rxi-35Sil MS, constant flow H2 2.5 mL/min; Restek Premium Precision split liner; 250°C, 50:1
GC oven: 225°C (0.1 min), 35°C/min to 330°C (0.9 min); Flame Ionization Detector 350°C

Scientific Challenges in the Cannabis Space

- Lack of standardization
- No published method
  - Each lab is operating with their own in-house methods
- Matrix issues
  - Cannabis is very complex
  - Several matrix types
- Validation challenges
  - No reference labs like other industries

Cannabinoids

LA Affie

Plant, Flower - Cured, Indoor

Harvest Process Lot: ; METRC Batch: 1A4040300000D49000001059; METRC S

The photo on this report is of a sample collected by the lab and may vary from the final packaging

Cannabinoids

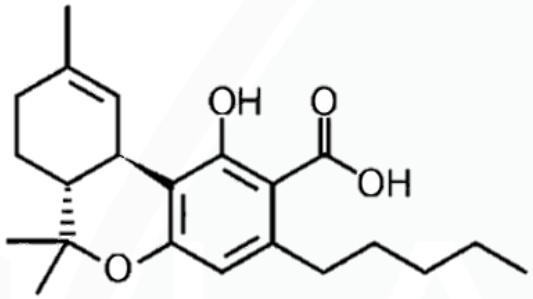
21.72%	0.06%	9.4 %
Total Potential THC	Total Potential CBD	Moisture

Cannabinoid	LOQ	Mass	Mass
	%	%	mg/g
THCa	0.05	23.79	237.9
Δ9-THC	0.05	0.86	8.6
CBD	0.05	<LOQ	<LOQ
CBDa	0.05	0.07	0.7
CBC	0.05	<0.05	<0.5
CBG	0.05	<LOQ	<LOQ
CBN	0.05	<LOQ	<LOQ
THCV	0.05	<LOQ	<LOQ
CBGa	0.05	<0.05	<0.5
Total		**24.71**	**247.1**

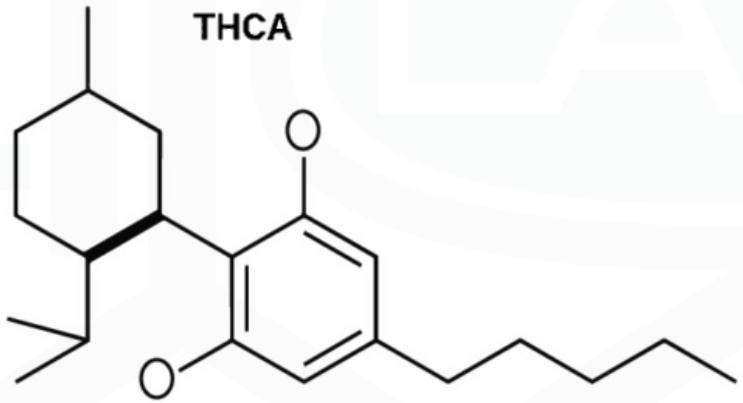
CBGA: The mother Cannabinoid

THCA vs Delta-9 THC

CBDA and CBD



THCA



Terpenes

Compound	Content, % oil
Monoterpenoids	
α-Pinene	1.11–31.0
β-Pinene	0.6–7.95
β-Myrcene	8.23–67.11
Limonene	0.2–16.38
Terpinolene	0.12-23.8
cis-Ocimene	0.04–10.28
Linalool	0.09–2.8
Sesquiterpenoids	
β-Caryophyllene	1.33–28.02
Humulene	0.28–12.61
β-Eudesmol	0.02-1.56
Caryophyllene oxide	0.3–11.3
trans-Nerolidol	0.09–1.72

MYRCENE

CONTRIBUTES TO SEDATIVE EFFECT OF STRONG INDICAS

SLEEP AID

MUSCLE RELAXANT

also found in hops

Reading a Lab Report

Certificate of Analysis

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1 of 2

Silver State

Sample: 1809TSF0059.4220
Strain: LA Affie
Batch #: LA081518; Lot #: LOT1448;
Sample Received: 09/14/2018; Report Generated: 09/18/2018
Harvest/Production Date: 08/15/2018

Lic. #65990416749820182121

LA Affie

Plant, Flower - Cured, Indoor
Harvest Process Lot: ; METRC Batch: 1A4040300000D49000001059; METRC Sample: 1A4040300000D49000001060

The photo on this report is of a sample collected by the lab and may vary from the final packaging

Safety

Pass Pesticides	Pass Microbials	Pass Mycotoxins
Not Tested Solvents	Pass Heavy Metals	Pass Foreign Matter

Cannabinoids

21.72%	0.06%	9.4 %
Total Potential THC	Total Potential CBD	Moisture

Cannabinoid	LOQ	Mass	Mass
	%	%	mg/g
THCa	0.05	23.79	237.9
Δ9-THC	0.05	0.86	8.6
CBD	0.05	<LOQ	<LOQ
CBDa	0.05	0.07	0.7
CBC	0.05	<0.05	<0.5
CBG	0.05	<LOQ	<LOQ
CBN	0.05	<LOQ	<LOQ
THCV	0.05	<LOQ	<LOQ
CBGa	0.05	<0.05	<0.5
Total		**24.71**	**247.1**

Terpenes

Orange | Cinnamon | Lavender

Terpene	LOQ	Mass	Mass
	%	%	mg/g
δ-Limonene	0.05	0.90	9.0
β-Caryophyllene	0.05	0.68	6.8
Linalool	0.05	0.31	3.1
β-Myrcene	0.05	0.20	2.0
β-Pinene	0.05	0.14	1.4
α-Humulene	0.05	0.10	1.0
α-Pinene	0.05	0.08	0.8
α-Bisabolol	0.05	<0.05	<0.5
Caryophyllene Oxide	0.05	<0.05	<0.5
Ocimene	0.05	ND	ND
Terpinolene	0.05	<0.05	<0.5
trans-Nerolidol	0.05	<0.05	<0.5
Total		**2.41**	**24.1**

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Certificate of Analysis

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Silver State

Sample: 1810TSF0146.5346
Strain: Citrus Sap
Batch #: CS102518; Lot #: LOT1494;
Sample Received: 10/25/2018; Report Generated: 10/30/2018
Harvest/Production Date: 10/25/2018

Lic. #65990416749820182121

Citrus Sap

Plant, Trim, Indoor
Harvest Process Lot: LOT1494; METRC Batch: 1A4040300000D49000001253; METRC Sample: 1A4040300000D49000001254

Pesticides — Pass

Analyte	Mass	LOQ	Limit	Status
	PPM	PPM	PPM	
Abamectin	ND	0.003	0.050	Pass
Acequinocyl	ND	0.020	4.000	Pass
Beta-Cyfluthrin	ND	0.020	4.000	Pass
Bifenazate	ND	0.750	15.000	Pass
Bifenthrin	ND	0.003	0.050	Pass
Captan	NR	0.003	0.050	NT
Cyfluthrin	ND	0.020	4.000	Pass
Cypermethrin	ND	0.003	0.050	Pass
Daminozide	ND	0.050	0.050	Pass
Dimethomorph	ND	3.000	60.000	Pass
Etoxazole	ND	0.350	7.000	Pass
Fenhexamid	ND	1.500	30.000	Pass
Flonicamid	ND	0.350	7.000	Pass
Fludioxonil	ND	0.001	0.020	Pass
Imidacloprid	ND	0.003	0.050	Pass
Myclobutanil	ND	0.450	4.000	Pass
Paclobutrazol	ND	0.010	0.050	Pass
Piperonyl Butoxide	ND	0.100	2.000	Pass
Plant Growth Regulators	ND			Tested
Pyrethrins	ND	0.050	1.000	Pass
Quintozene	ND	0.010	0.200	Pass
Spinetoram	ND	0.085	1.700	Pass
Spinosad	ND	0.085	1.700	Pass
Spirotetramat	ND	0.050	10.000	Pass
Thiamethoxam	ND	0.001	0.020	Pass
Trifloxystrobin	ND	0.550	11.000	Pass

Heavy Metals — Pass

Analyte	Mass	LOQ	Limit	Status
	PPM	PPM	PPM	
Arsenic	ND	0.460	2.000	Pass
Cadmium	ND	0.230	0.820	Pass
Lead	ND	0.310	1.200	Pass
Mercury	ND	0.120	0.400	Pass

Microbials — Pass

Analyte	Units	Limit	Status
	CFU/g	CFU/g	
Aspergillus flavus	ND	1	Pass
Aspergillus fumigatus	ND	1	Pass
Aspergillus niger	ND	1	Pass
Aspergillus terreus	ND	1	Pass
Total Enterobacteriaceae	ND	1000	Pass
Total Coliforms	10	1000	Pass
Pathogenic E. Coli	ND	1	Pass
Salmonella	ND	1	Pass
Total Yeast & Mold	ND	10000	Pass

Residual Solvents — Not Tested

Analyte	Mass	LOQ	Limit	Status

Mycotoxins — Pass

Analyte	Mass	LOQ	Limit	Status
	PPM	PPM	PPM	
Aflatoxins	ND	0.00	0.02	Pass
B1	ND	0.00		Tested
B2	ND	0.00		Tested
G1	ND	0.00		Tested
G2	ND	0.00		Tested
Ochratoxin A	ND	0.00	0.02	Pass
Total Mycotoxins	ND		0.02	Pass

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Flower vs Oil and Edibles Testing

Certificate of Analysis

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Silver State

Sample: 1810TSF0051.4882
Strain: Bulk Distillate
Batch #: 20181008A; Lot #: 20181008A; Production Run #: 20181008A;
Sample Received: 10/09/2018; Report Generated: 10/12/2018
Harvest/Production Date: 10/08/2018

Lic. #93052076991207348450

Bulk Distillate
Concentrates & Extracts, Distillate, Vacuum Distillation
Harvest Process Lot: ; METRC Batch: 1A40403000000D4A000006397; METRC Sample: 1A4040300000D4A000006398

The photo on this report is of a sample collected by the lab and may vary from the final packaging

Safety

Not Tested Pesticides	Pass Microbials	Pass Mycotoxins
Not Tested Solvents	Pass Heavy Metals	Pass Foreign Matter

Cannabinoids

85.8%	0.3%	NR %
Total Potential THC	Total Potential CBD	Moisture

Cannabinoid	LOQ	Mass	Mass
	%	%	mg/g
THCa	0.1	<LOQ	<LOQ
Δ9-THC	0.1	85.8	858
CBD	0.1	0.3	3
CBDa	0.0	<LOQ	<LOQ
CBC	0.0	2.1	21
CBG	0.0	1.7	17
CBN	0.0	1.0	10
THCV	0.0	0.3	3
CBGa	0.0	<LOQ	<LOQ
Total		91.2	912

Terpenes

Terpene	LOQ	Mass	Mass
	%	%	mg/g
α-Bisabolol	0.05	<0.05	<0.5
α-Humulene	0.05	ND	ND
α-Pinene	0.05	ND	ND
β-Caryophyllene	0.05	ND	ND
β-Myrcene	0.05	ND	ND
β-Pinene	0.05	ND	ND
Caryophyllene Oxide	0.05	ND	ND
δ-Limonene	0.05	ND	ND
Linalool	0.05	ND	ND
Ocimene	0.05	ND	ND
Terpinolene	0.05	ND	ND
trans-Nerolidol	0.05	ND	ND
Total		0.00	0

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Silver State

Sample: 1712TSF0058.2766
Strain: Peanut Butter Chocolate Fudge
Batch#: ELOT20171218; Lot: ELOT20171218
Sample Received: 12/18/2017; Report Generated: 12/28/2017

Lic. #87700384583047744472

Peanut Butter Chocolate Fudge
Ingestible, Baked Goods, CO2

The photo on this report is of a sample collected by the lab and may vary from the final packaging

Safety

Not Tested Pesticides	Pass Microbials	Not Tested Mycotoxins
Not Tested Solvents	Not Tested Heavy Metals	Pass Foreign Matter

Cannabinoids

19.3 mg/unit	<LOQ	%
Total Potential THC	Total Potential CBD	Moisture

Cannabinoid	LOQ	Mass	Mass
	mg/unit	mg/unit	mg/g
THCa	11.0	<LOQ	<LOQ
Δ9-THC	11.0	19.3	0.9
CBD	11.0	<LOQ	<LOQ
CBDa	8.8	<LOQ	<LOQ
CBC	8.8	<LOQ	<LOQ
CBG	8.8	<LOQ	<LOQ
CBN	8.8	<LOQ	<LOQ
THCV	8.8	<LOQ	<LOQ
CBGa	8.8	<LOQ	<LOQ
Total			0.9

1 Unit = 22 grams, 22g

Terpenes

Terpene	LOQ	Mass	Mass
	%	%	mg/g
α-Bisabolol	0.05	ND	ND
α-Humulene	0.05	ND	ND
α-Pinene	0.05	ND	ND
β-Caryophyllene	0.05	ND	ND
β-Myrcene	0.05	ND	ND
β-Pinene	0.05	ND	ND
Caryophyllene Oxide	0.05	ND	ND
δ-Limonene	0.05	ND	ND
Linalool	0.05	ND	ND
Ocimene	0.05	ND	ND
Terpinolene	0.05	ND	ND
trans-Nerolidol	0.05	ND	ND
Total		0.00	0

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Questions?

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