

New Capabilities in the Morgan Hemp Lab

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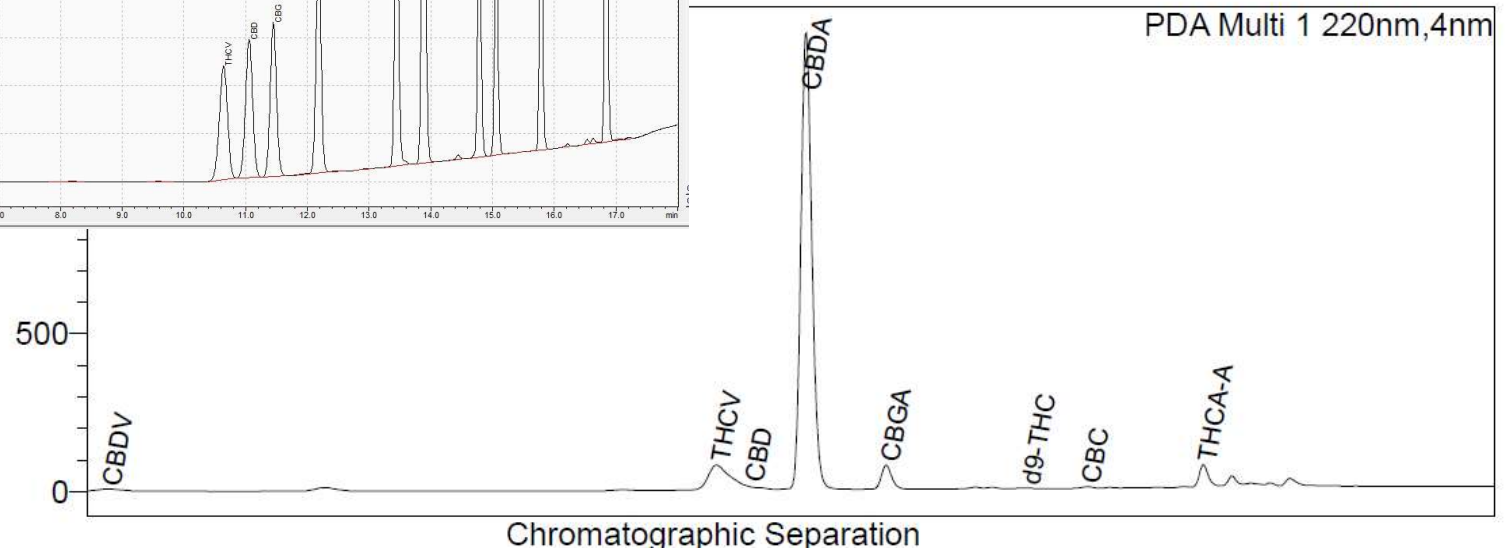
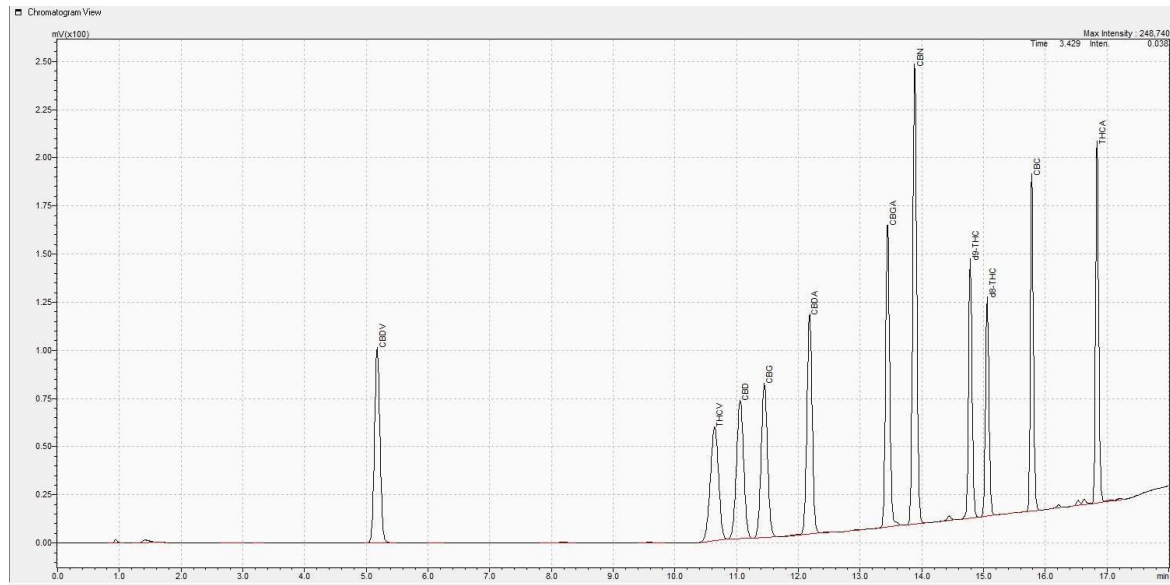


New Capabilities-Cannabinoids Analysis

- Analysis of **eleven** cannabinoids:
 - CBDV, THCV, **CBD**, CBG, **CBDA**, CBGA, CBN, **D9-THC**, D8-THC, CBC, **THCA**
 - Better separation
 - Better Accuracy

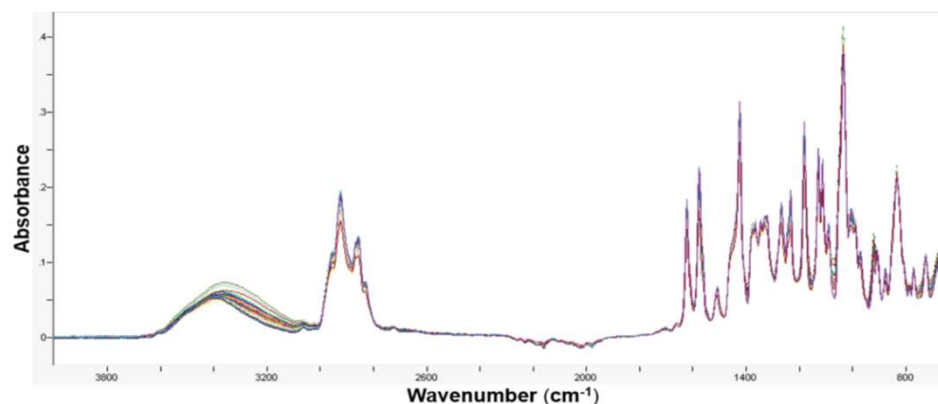
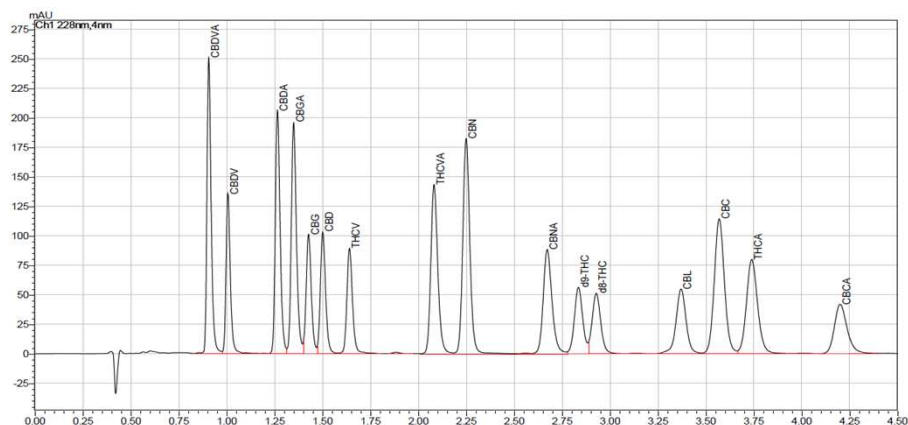


New Capabilities-Cannabinoids Analysis



FTIR for Rapid Onsite Analysis of Cannabinoids

- HPLC analysis completed
- Measured over 60 samples for FTIR
- Working on the mathematic method
- Available this fall



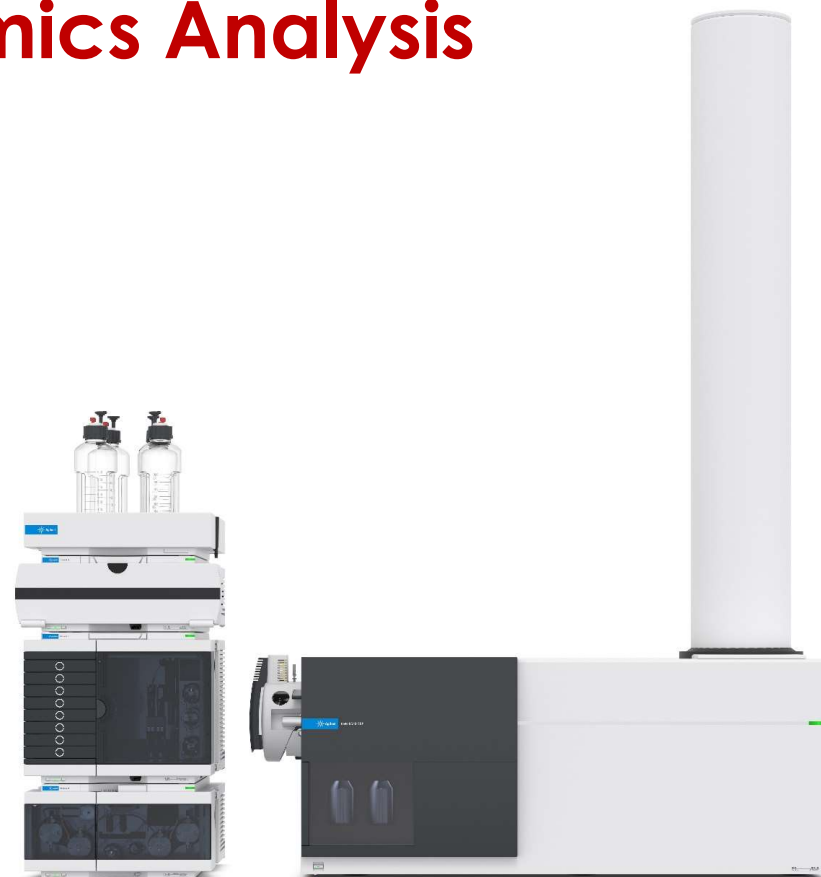
New Capabilities-Metal Analysis

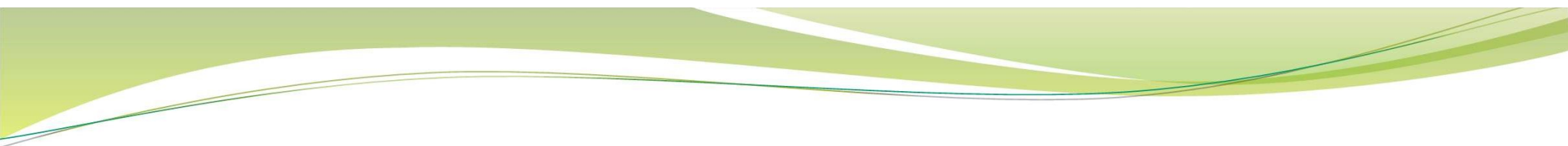
- Agilent 7800 ICP-MS
 - Maximize throughput
 - Reduce Sample preparation
 - High accuracy
 - Wide dynamic range



New Capabilities-Metabolomics Analysis

- Agilent 6546 LC/Q-TOF
 - Metabolomic profiling
 - Identify minor Cannabinoids
 - Identify other compounds





Cannabinoids Analysis Results for 2019 Season

- 122 samples analyzed
 - More than 14 Strains
 - More than 10 growers
 - Flowers, leaves, branches, stems, and roots

Cannabinoids Analysis Results for 2019 Season

Cannabinoids Content (%)

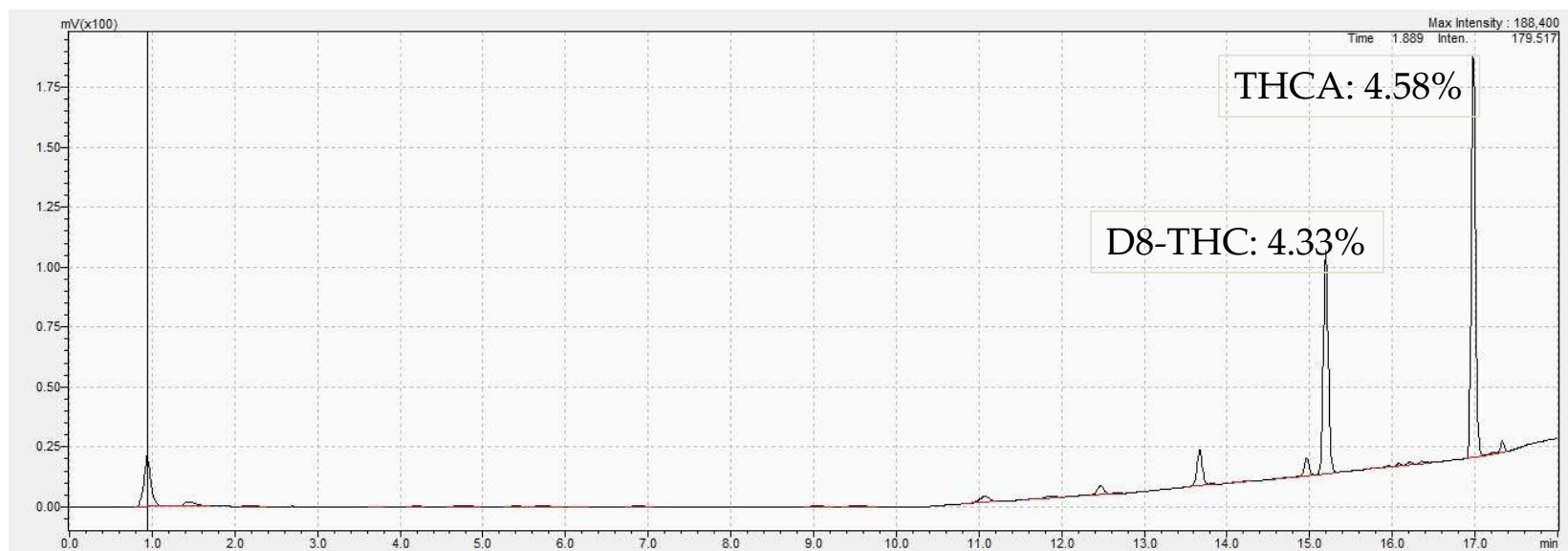
Strains	CBDV	THCV	CBD	CBG	CBDA	CBGA	CBN	D9-THC	D8-THC	CBC	THCA
Baox	0 ~0.119	0 ~0.384	0.139~1.50	<0.05	6.04~15.58	0.068~0.446	ND	0~0.197	<0.05	<0.05~0.122	0.264~0.58
Box Wine	<0.05	ND	0.282~0.812	0 ~<0.05	2.07~7.99	0.089~0.182	ND	<0.05~0.78	ND	<0.05~0.104	<0.05~0.218
Bluegum	<0.05	0 ~<0.05	0.211~0.718		1.90~4.16	<0.05 ~0.11	ND	<0.05	ND	<0.05 ~0.126	<0.05~0.101
Cherry	<0.05	0~0.252	0.682~1.20	<0.05	9.01~17.7	0.087~0.383	ND	<0.05~0.120	ND	<0.05~0.077	0.269~7.17
Cherry Blossoms	0.09	<0.05	1.45	ND	13.5	0.384	ND	0.121	<0.05	0.106	0.399
Cherry Kandy	<0.05	0 ~ <0.05	0.099~0.586	<0.05	1.66~4.71	<0.05~0.172	<0.05	<0.05~0.109	ND	<0.05~0.066	<0.05~0.112
Cherry Wine	<0.05	0 ~ <0.05	<0.05~1.57	ND	0.296~5.73	<0.05~0.110	0~0.05	0~0.05	ND	0~0.147	0.148
Jupiter	<0.05	<0.05	0.335~0.513	<0.05	9.09~12.6	0.272~0.417	0~<0.05	<0.05	ND	<0.05	0.327~4.26
Lifter	0`<0.05	<0.05	0.231~0.724	<0.05	5.56~8.67	0.128~0.370	DS	0.190~0.689	<0.05	0~0.068	0.447~1.05
Plot3/4	0.067~0.069	<0.05	0.126~0.156	<0.05	6.98~10.3	0.296~0.386	ND	<0.05	ND	<0.05	0.284~0.433
Trump 1	0.107~0.113	0 ~0.273	0.321~1.07	<0.05	11.6~14.7	0.207~0.237	0~<0.05	<0.05~0.156	NA	<0.05~0.107	0.421~0.531
Trump 2	0.118~0.138	0.05~0.181	0.240~0.369	<0.05	12.8~15.1	0.287~0.420	ND	<0.05	ND	<0.05	0.533~0.587
var1	<0.05	0~0.05	0.077~0.162	0~0.05	3.31~5.80	0.180~0.364	ND	<0.05	ND	<0.05	0.119~0.222
var2	0.09	<0.05~0.07	0.157~0.315	<0.05	9.31~11.0	0.420~0.537	ND	<0.05	ND	<0.05	0.379~0.416
C4	0~0.087	0~0.083	0.332~0.862	<0.05	5.00 ~ 7.58	0.148~0.328	<0.05	0.594~1.066	0.082~0.353	<0.05~0.094	2.61~7.03

Cannabinoids Analysis Results for 2019 Season

Cannabinoids Content (%)

Strains	CBDV	THCV	CBD	CBDA	CBGA	CBC	THCA
Baox	0 ~0.119	0 ~0.384	0.139~1.50	6.04~15.58	0.068~0.446	<0.05~ 0.122	0.264~0.58
Box Wine	<0.05	ND	0.282~0.812	2.07~7.99	0.089~0.182	<0.05~0.104	<0.05~0.218
Bluegum	<0.05	0 ~<0.05	0.211~0.718	1.90~4.16	<0.05 ~ 0.11	<0.05 ~0.126	<0.05~0.101
Cherry	<0.05	0~0.252	0.682~1.20	9.01~17.3	0.087~0.383	<0.05~0.077	0.269~0.717
Cherry Blossoms	0.09	<0.05	1.45	13.5	0.384	0.106	0.399
Cherry Kandy	<0.05	0 ~ <0.05	0.099~0.586	1.66~4.71	<0.05~0.172	<0.05~0.066	<0.05~0.112
Cherry Wine	<0.05	0 ~ <0.05	<0.05~1.57	0.296~5.73	<0.05~0.110	0~0.147	0.148
Jupiter	<0.05	<0.05	0.335~0.513	9.09~12.6	0.272~0.417	<0.05	0.327~0.426
Lifter	0`<0.05	<0.05	0.231~0.724	5.56~8.67	0.128~0.370	0~0.068	0.447~1.05
plot3/4	0.067~0.069	<0.05	0.126~0.156	6.98~10.3	0.296~0.386	<0.05	0.284~0.433
Trump 1	0.107~0.113	0 ~0.273	0.321~1.07	11.6~14.7	0.207~0.237	<0.05~0.107	0.421~0.531
Trump 2	0.118~0.138	0.05~0.181	0.240~0.369	12.8~15.1	0.287~0.420	<0.05	0.533~0.587
var1	<0.05	0~0.05	0.077~0.162	3.31~5.80	0.180~0.364	<0.05	0.119~0.222
var2	0.09	<0.05~0.07	0.157~0.315	9.31~11.0	0.420~0.537	<0.05	0.379~0.416

Cannabinoids Analysis Results for 2019 Season



Cannabinoids Analysis Results for 2019 Season

Cannabinoids Content (%)

Plant Parts	THCV	CBD	CBDA	CBGA	D9-THC	CBC	THCA
Queen Dream							
Branches	no	no	0.114	no	no	no	<0.05
Leaves	no	0.255	2.88	<0.05	<0.05	<0.05	0.078
Roots	no	no	no	no	no	no	no
Stems	no	no	<0.05	no	no	no	no
Cherry Wine							
Branches	no	0.311	1.53	<0.05	<0.05	<0.05	<0.05
Flowers	no	1.57	5.73	0.110	0.103	0.147	0.148
Leaves	<0.05	0.198	1.13	<0.05	<0.05	<0.05	<0.05
Seeds	no	0.058	0.362	<0.05	no	<0.05	<0.05
Baox							
Flowers	0.299	1.06	13.6	0.166	0.126	0.114	0.450
Branches	no	0.058	0.483	no	no	no	no
Roots	no	no	<0.05	no	no	no	no
Stems	no	no	0.0598	no	no	no	no

Cannabinoids Analysis Results for 2019 Season

Summary

- High CBDA strains: 12.6 ~ 17.3%
 - Cherry > Baox > Trump 2 > Trump 1 > Jupiter
- High CBGA strains: 0.537 ~ 0.384%
 - Var2, Baox, Jupiter, Trump 2, Plot3/4, cherry blossom
- High CBDV strains: 0.119 ~ 0.139%
 - Trump 2, Trump 1, Baox
- High THCV strains: 0.181 ~ 0.384%
 - Baox, Trump 1, cherry, Trump 2
- High CBC strains: 0.107 ~ 0.147%
 - Cherry wine, Bluegum, Baox, Trump 1