As states continue to institute laws for the medical and recreational use of cannabis, ensuring available products are safe for public consumption has become a priority for various state agencies. While potency testing garners the most public attention, pesticide quantitation remains one of the most difficult hurdles for laboratories to overcome. The complex mixture of pesticides and metabolites are the greatest obstacles to efficient, accurate detection and quantitation of pesticides in cannabis. Additionally, regulated pesticide lists are short, creating an incentive for less scrupulous growers to switch to compounds outside the regulatory scope. Untargeted screening allows analysts to identify issues before they become health risks, to identify potential problems.

**Data Collection Conditions**

-**Sample Preparation**
  - 1.0 g of ground sample was combined with 15 mL ACN and shaken for 5 minutes.
  - Rinsed a 6 mL SPE cartridge (Agilent SampliQ™ C18 endcapped) with 5 mL ACN, twice.
  - Rinsed the sample twice with 5 mL ACN, decanted into SPE, and collected effluent.
  - Decanted the 15 mL of ACN into the SPE cartridge, collected all effluent under very low vacuum (~1 drop/s).

-**Instrument**
  - LECO Pegasus® BT 4D

-**Chromatography**
  - LECO GCxGC Thermal Modulator and 2nd Oven in 7890 GC
  - Injection Volume: 1uL MMI (170-280 °C @ 400 °C/min) splitless
  - Carrier Gas: He, 1.4 mL/min
  - Gas Chromatograph LECO GCxGC Thermal Modulator and 2nd Oven in 7890 GC
  - Ion Source Temperature: 250 °C
  - Mass Range (m/z): m/z 45-520
  - Mass Spectrometer: LECO Pegasus BT 4D
  - Thermal Modulator: 10 °C relative to secondary oven
  - Guard Column: 1 m 0.25 mm Phenomenex Zebron HT (Torrance CA, USA)
  - Secondary Oven held +5 °C relative to primary oven
  - Modulation Period: 3 s
  - Thermal Modulator 2nd Oven in 7890 GC
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  - Carrier Gas: He, 1.4 mL/min
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  - Modulation Period: 3 s

-**Non-Target Peak Detection**
  - Issues with Standards You Don't Expect
  - For identification of non-target compounds in complex standard mixtures.

Conclusions

- Continuing evolution of state laws and testing regulations will require labs to adapt to an ever-changing landscape.
- GCxGC dramatically improves chromatographic resolution, leading to superior deconvolution and cleaner spectra for identification of non-target compounds.
- Full scan acquisition at SRM-like detection limits enables target and non-target analysis on the same analytical platform.

Example LOQs in CBD Hemp

<table>
<thead>
<tr>
<th>Analyte</th>
<th>BT LOQ</th>
<th>CA Action</th>
<th>MI Action</th>
</tr>
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<tbody>
<tr>
<td>CBD</td>
<td>25</td>
<td>500</td>
<td>200</td>
</tr>
<tr>
<td>THC</td>
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</tr>
<tr>
<td>CBC</td>
<td>10</td>
<td>100</td>
<td>400</td>
</tr>
</tbody>
</table>

Table 1. Limit of Quantitation for selected analytes compared to the California and Michigan reporting limits. LOQ was determined as the lowest standard within 20% of expected concentration, ion ratio(s) within 30% of the standard average and R² ≥ 0.99.