**Introduction**

The global agriculture industry uses a plethora of pesticides for the production of food and beverages. Producers require pesticides to meet the increasing demand for reasonably priced food both in and out of season. This growing demand has increased the use of pesticides, placing great agricultural positions evaluating risks in the food supply and environment.

Analytical laboratories are then strained to evaluate and quantify hundreds of pesticides in a wide range of matrices. Not only are laboratories faced with the task of identifying compounds that degrade their ability to accurately identity and quantify the multitude of target pesticides. The MassHunter Pesticide & Environmental Pollutant MRM Database (Rev. A.01.01) is the most comprehensive GC MRM database available for their acquisition methods for their target compounds in a variety of matrices. The availability of multiple MRM transitions allows laboratories to address and solve the analytical challenges that they have been faced with. Matrix interferences have been a common cause for MRMs in pesticides analysis. It has been seen that the weakness of a given compound's MRMs can change depending on the matrix being measured, due to factors such as increased chromatic dispersion which changes the peak and areas. The ability to have multiple MRMs from which to choose aids in lab productivity, improved quant method generation, and achieving optimal analysis.

**Methodology**

The analysis was conducted on an Agilent 7890B GC and 5975C Series Triple Quadrupole GC/MS system. See Table 1 – for method parameters. The system was configured with a PTV-NaI equipped with an ultra-inert liner union (PUU) for the use of backflushing (see Figure 1).

**Results**

Across the globe there are a multitude of different applications and regulations that are followed. The P&EP MRM Database provides all of the material for users to identify the optimal MRMs for their specific analytes. In order to provide guidance on the optimal use of these MRMs, Agilent has begun to look at target compounds in a variety of matrices. A total of 185 compounds were selected for the analysis. Each compound was analyzed in each of the 8 matrices and in acetonitrile (ACN). The top 5 MRM transitions for each target compound were selected based on response, ion ratio, and reproducibility. From these top 5 MRMs were then selected in a matrix specific method for further optimal analysis. The majority of pesticides analyzed indicated that the responses of the optimal MRM transitions often change. The availability of multiple MRMs per compound allows a user to discriminate among compounds with similar transitions, and to choose MRMs that will best discriminate among interferences.

**Conclusions**

Matrix interferences are a common concern for MRM acquisitions in pesticide analysis and can alter a target compound's iLOQ. Changes in Mass (Q1) and Qual ions (Q1, Q2...) responses are the most common. These changes may affect the relative abundances of the MRM which play a pivotal number debate for optimal quantitative data analysis.

- **The availability of multiple MRMs per compound allows a user to discriminate among compounds with similar transitions, and to select MRMs that will best discriminate among interferences.**
- **The main challenges come from extremely large matrix interferences, which are encountered more often in complex matrices such as soil and biological tissues.**
- **Inadequate MRMs in the database can push a target out of a Time Segment.** In these cases great care must be exercised to produce accurate results for all analytes.

**Matrix Interferences Are Real**

The THS Series Triple Quadrupole GC/MS system can confirm pesticide residues at the low ppt level even in the most complex extracts. The interferences were present at concentration ranging from 70 pg/µL to 150 pg/µL. 50% of compounds a collinear curve went up to 0.3 µM was produced. Analyzed pesticides obtained a iLOQ of rejected measurements of 2.35% and 25% have a LOD less than 1 µg/µL.

**Changes in Quantitative (Q0) and Qual Ions (Q1, Q2,...)**

The majority of pesticides analyzed indicated that the responses of the optimal MRM transitions often change.