

FOOD ANALYSIS

LC-MS/MS ANALYSIS OF PYRROLIZIDINE ALKALOIDS FROM PLANT MATRIX USING THE AGILENT 1290 UHPLC COUPLED WITH 6490 QQQ.

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Abstract

Solution Note

Food

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Introduction

Pyrrolizidine alkaloids (PAs) are the toxicologically important secondary metabolites synthesized by plants and so far approximately 6000 plant species have been identified as possible sources (3% of all flowering plants). Unsaturated PAs (1,2-double bond in the structure) are known to be genotoxic, carcinogenic and hepatotoxic, therefore, the ingestion of these alkaloids may result in chronic and acute effects. Reports on poisonings revealed that lung and liver are predominantly affected.

Additional health risks are associated with the contamination of food and feed by various routes throughout the food chain, resulting in poisonings in humans and animals. Depending on the type of sample and degree of contamination, quantification requires sub µg/kg sensitivity. To provide a solution to this challenging task Agilent has developed a sensitive and robust method using the Agilent 6490 Triple Quadrupole LC-MS/MS system in combination with the Agilent 1290 Infinity Binary LC system. Sample preparation was based on the BfR protocol (BfR-PA-Tee-1.0/2013). The developed method allowed the quantification of PAs (Retrorsin-N-oxid, Senecionin-N-oxid, Retrorsin, Seneciphyllin-N-oxid, Senecionin, and Seneciphyllin) below 0.05 µg/kg in plant matrix.



UHPLC – QQQ Setup:

- Agilent 1290 Infinity Binary LC system
- Agilent 6490 Triple Quadrupole LC-MS/MS system
- Agilent Extend-C18, 100 x 2.1 mm, 1.8 µm
- Ammonia solution (25%), Water, Acetonitrile



Conclusion

The highly sensitive method presented here allows the determination of Pyrrolizidine alkaloids in plant material at low concentrations (sub $\mu\text{g}/\text{kg}$). The method could be adapted to include other natural toxins to maximize the protection of consumers from contaminated produce.

Highly sensitive QQQ, flexible combination with different UHPLC systems and columns, and workflow-guided software make Agilent your trusted partner for challenging food analyses.

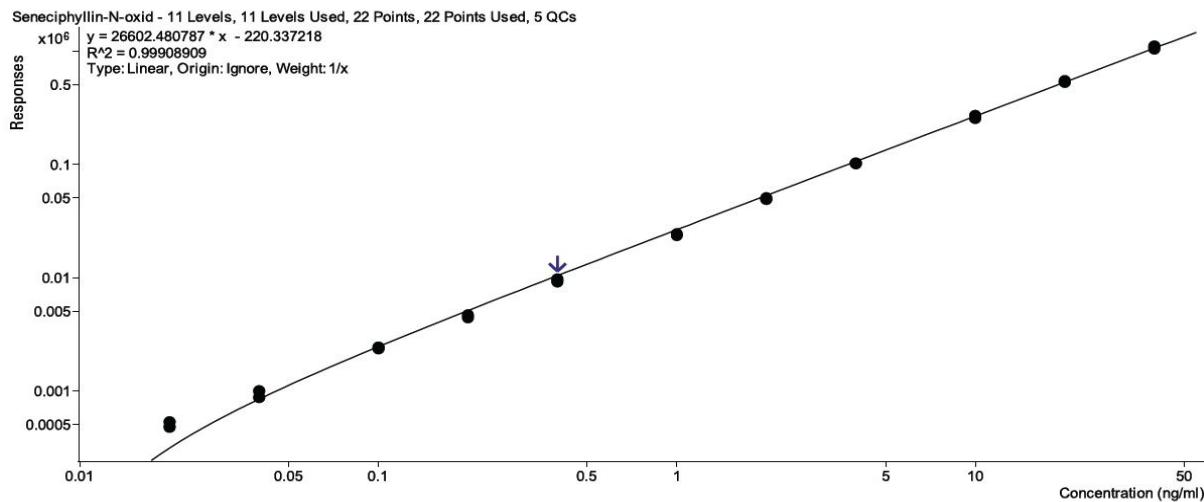


Figure 1. External calibration curve for Seneciphyllin-N-oxid using log-log visualization. Concentration range: 0.02 – 50 ng/mL in solvent.

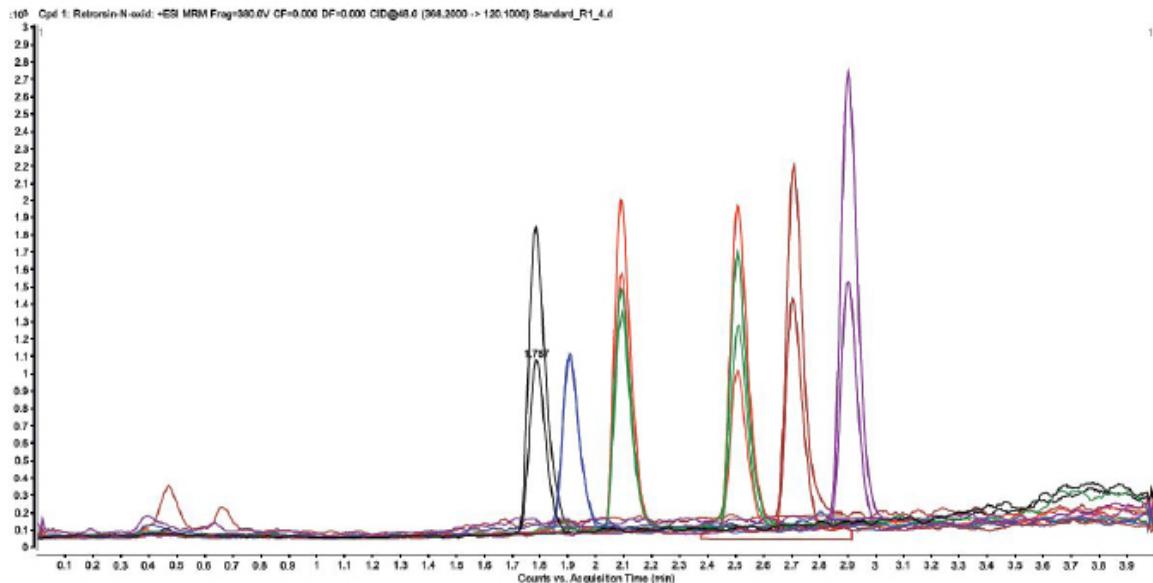


Figure 2. Representative overlaid MRM chromatogram of the target PAs at 0.2 ng/mL concentration level.



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