

Poster Reprint

**ASMS 2023**  
**Poster number MP 202**

# A Screening Method for the Determination of Atrazine in Aqueous and Lipid Based Foods By LC/MS

Donna Payne<sup>1</sup>, Mike Adams<sup>2</sup>, Sue D'Antonio<sup>3</sup>, Limian Zhao<sup>3</sup>

<sup>1</sup>AnalytEval

<sup>2</sup>CWC Labs

<sup>3</sup>Agilent Technologies

## Introduction

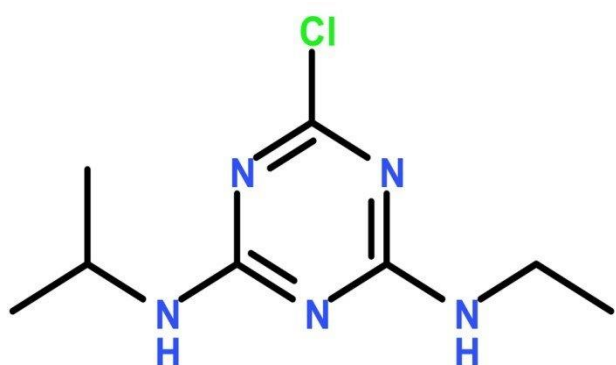
Atrazine (6-chloro-4-*N*-ethyl-2-*N*-propan-2-yl-1,3,5-triazine-2,4-diamine) is sold under the names Atrazine, Aatrex®, Aatram®, Atratol®, and Gesaprim®. It is a colorless or white, odorless crystalline powder with an exact mass of 215.0937732 and a molecular weight of 215.68. Atrazine is the most commonly detected pesticide contaminant of ground, surface, and drinking water. Atrazine is considered moderately persistent and mobile in most soils, showing relatively slow breakdown by hydrolysis, photolysis, or biodegradation.

Atrazine is the second most prevalently used herbicide after glyphosate to control unwanted vegetation. It is applied as a pre-emergent herbicide to maximize crop productivity by minimizing competition for resources. Atrazine is usually applied in the spring and summer months in a powdered, liquid or granular form. Atrazine is taken up by all plants, but in plants not affected by atrazine, it is broken down before it can have an effect on photosynthesis.

Atrazine is a chlorinated triazine systemic pre-emergent herbicide that is used to selectively control annual grasses and broadleaf weeds. It is most heavily used on corn, sorghum and sugar cane crops. It is also used quite frequently in nut, pineapple, guava and other specialty crops. The Maximum Residue Limit (MRL) in the US for atrazine in most fruits and vegetables is 200ppb, while the EU maintains a 50ppb MRL on those same fruits and vegetables. Atrazine is also applied to highway and railway rights-of-way, lawns and golf courses and Christmas tree farms to reduce broadleaf and grassy weed infestation.

### Atrazine

6-chloro-4-*N*-ethyl-2-*N*-propan-2-yl-1,3,5-triazine-2,4-diamine



## Experimental

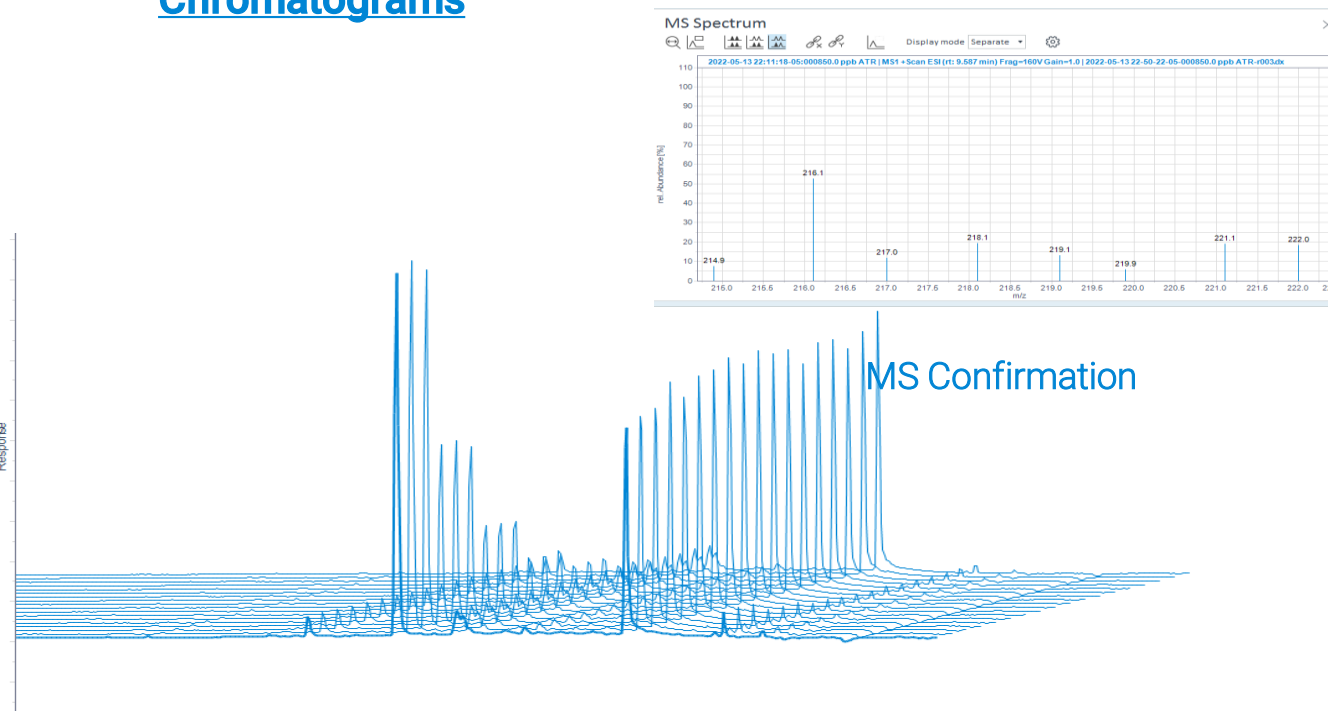
### Equipment

All experiments in this study were performed using an Agilent 1290 Infinity II LC system consisting of a 1290 Infinity II Multisampler (G7104A), 1290 Infinity Flexible Pump (G7120A), 1290 Infinity II Multicolumn Thermostat (G7116B) coupled to an InfinityLab LC/MSD iQ (G6160A) mass spectrometer. The system was controlled by Agilent OpenLab CDS software, version 2.5. Data processing was also performed using the same Agilent OpenLab CDS software.

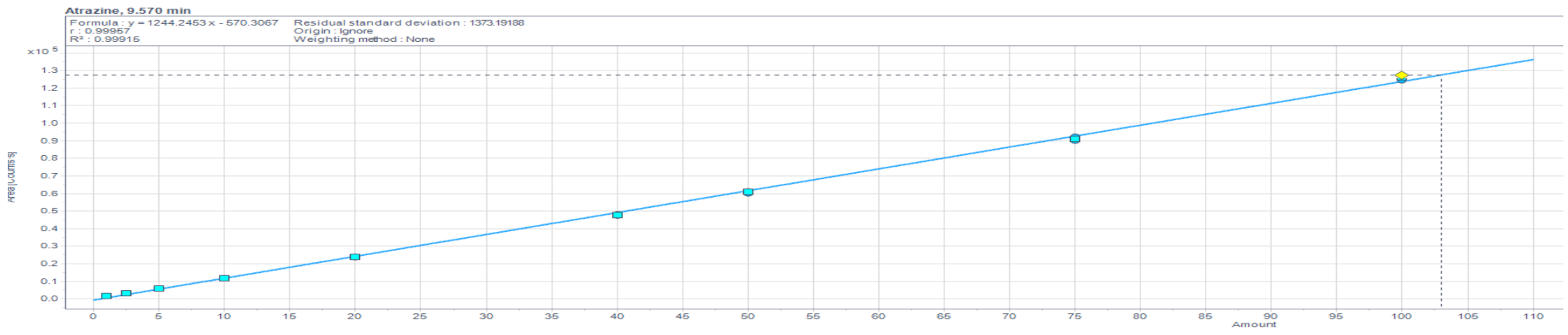
Parameter	Settings												
Analytical Column	Agilent Poroshell 120 EC-C18 3x150mm, 1.9 µm Part Number 693675-302												
Column Temperature	30.0° C												
Injection Volume	1 µL												
Run Time	15.00 minutes												
Post-run Time	4.00 minutes												
Mobile Phase Flow Rate	0.5 mL/min												
Mobile Phase A	Aqueous 0.1% formic acid, 5 mM ammonium formate												
Mobile Phase B	Methanol												
Gradient	<table border="1"><thead><tr><th>Time (min)</th><th>Flow (mL/min)</th><th>%A</th><th>%B</th></tr></thead><tbody><tr><td>0.20</td><td>0.5</td><td>95.00</td><td>5.00</td></tr><tr><td>10.50</td><td>0.5</td><td>0.00</td><td>100.00</td></tr></tbody></table>	Time (min)	Flow (mL/min)	%A	%B	0.20	0.5	95.00	5.00	10.50	0.5	0.00	100.00
Time (min)	Flow (mL/min)	%A	%B										
0.20	0.5	95.00	5.00										
10.50	0.5	0.00	100.00										
MS Ion Source	Electrospray												
Nitrogen Gas Temperature	200° C												
Gas Flow	10 L/min												
Nebulizer	35 psi												
Capillary Voltage	3500 V												



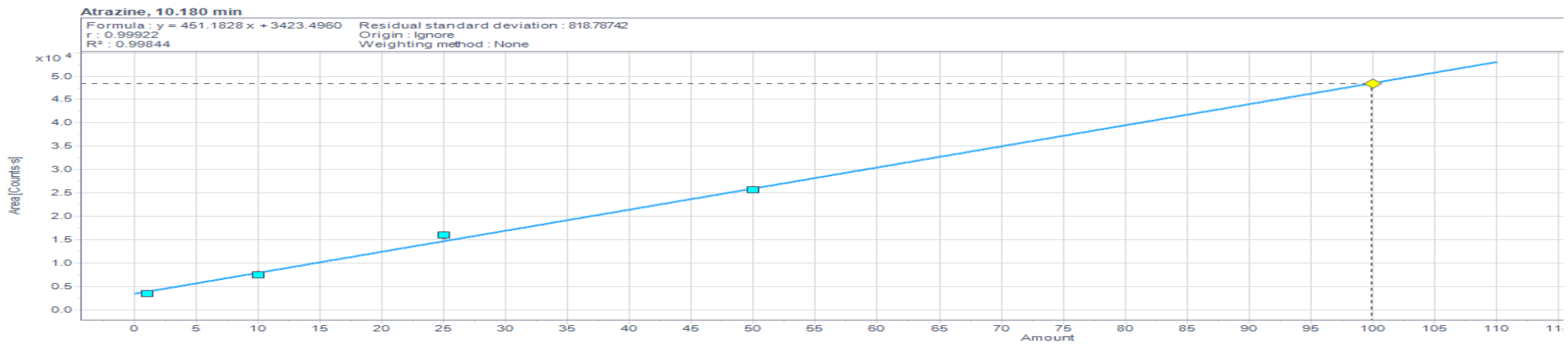
### Atrazine in Methanol Calibration Curve Chromatograms



### Atrazine in Methanol Calibration Curve

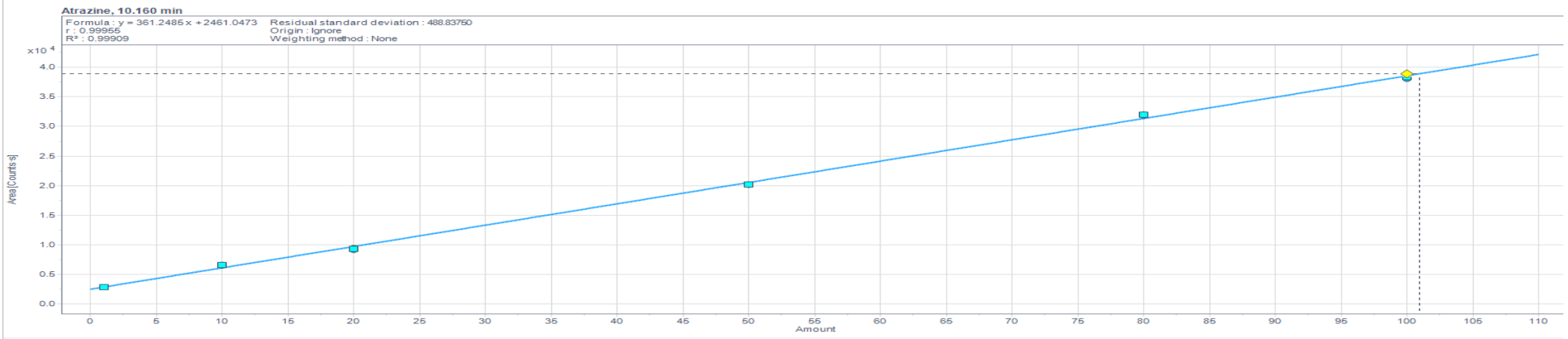


### Calibration Curve

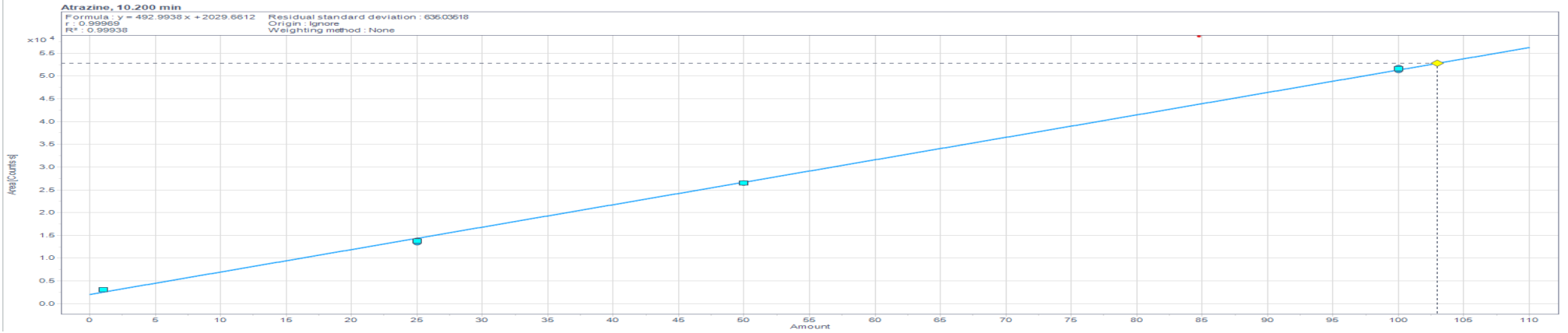


▶ Calibration table

### Calibration Curve



### Calibration Curve



## Results and Discussion

Method Evaluation	Methanol	Corn	Pineapple	Cashews
Standard Range (ppb)	1 -100	1 - 100	1 - 100	1 - 100
r =	0.99957	0.99942	0.99955	0.99969
R <sup>2</sup> =	0.99915	0.99844	0.99909	0.99938
Accuracy (%)	96.69	97.01	106.00	99.20
Relative Standard Deviation (%)	5.27	11.38	5.92	3.12
Limit of Quantitation (ppb)	0.15	0.10	0.20	0.10

## Conclusions

This method, in concert with the Agilent Technologies Agilent 1290 Infinity II LC coupled with an Agilent iQ Mass Spectrometer has been shown to be effective, sensitive, accurate, robust and cost effective for the analysis and screening of atrazine in aqueous and lipid-based food matrices. Suggestions for further study include the utilization of this method for the analysis of atrazine in environmental applications.

## References

- <sup>1</sup>International Journal of Development Research; Vol. 10, Issue 11, pp.41925-41929, November 2020. .
- <sup>2</sup>EPA - <https://www.epa.gov/ingredients-used-pesticide-products/atrazine>
- <sup>3</sup>PubChem-<https://pubchem.ncbi.nlm.nih.gov/atrazine>
- <sup>4</sup><https://pubmed.ncbi.nlm.nih.gov/29550685/>
- <sup>5</sup>Proc Natl Academy of Science USA.2010 Mar 9;107(10):4612-7. doi: 10.1073/pnas.0909519107. Epub 2010 Mar 1

<https://www.agilent.com/en/promotions/asms>

This information is subject to change without notice.

DE9DE9879416287

© Agilent Technologies, Inc. 2023  
Published in USA, May 31,2023

