Poster Reprint

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

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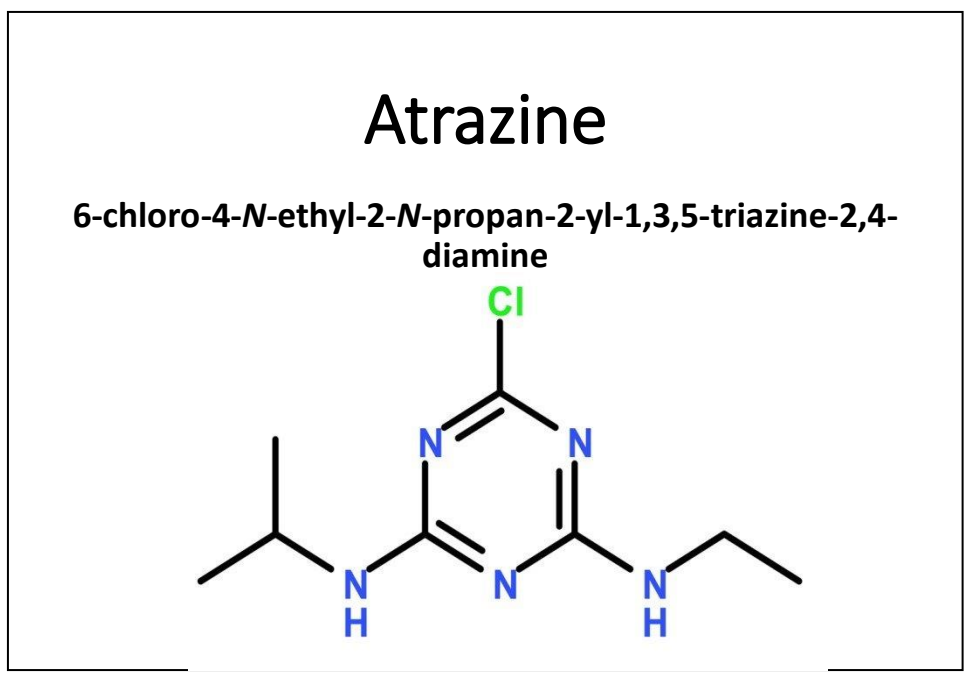
## Introduction

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.




## Experimental

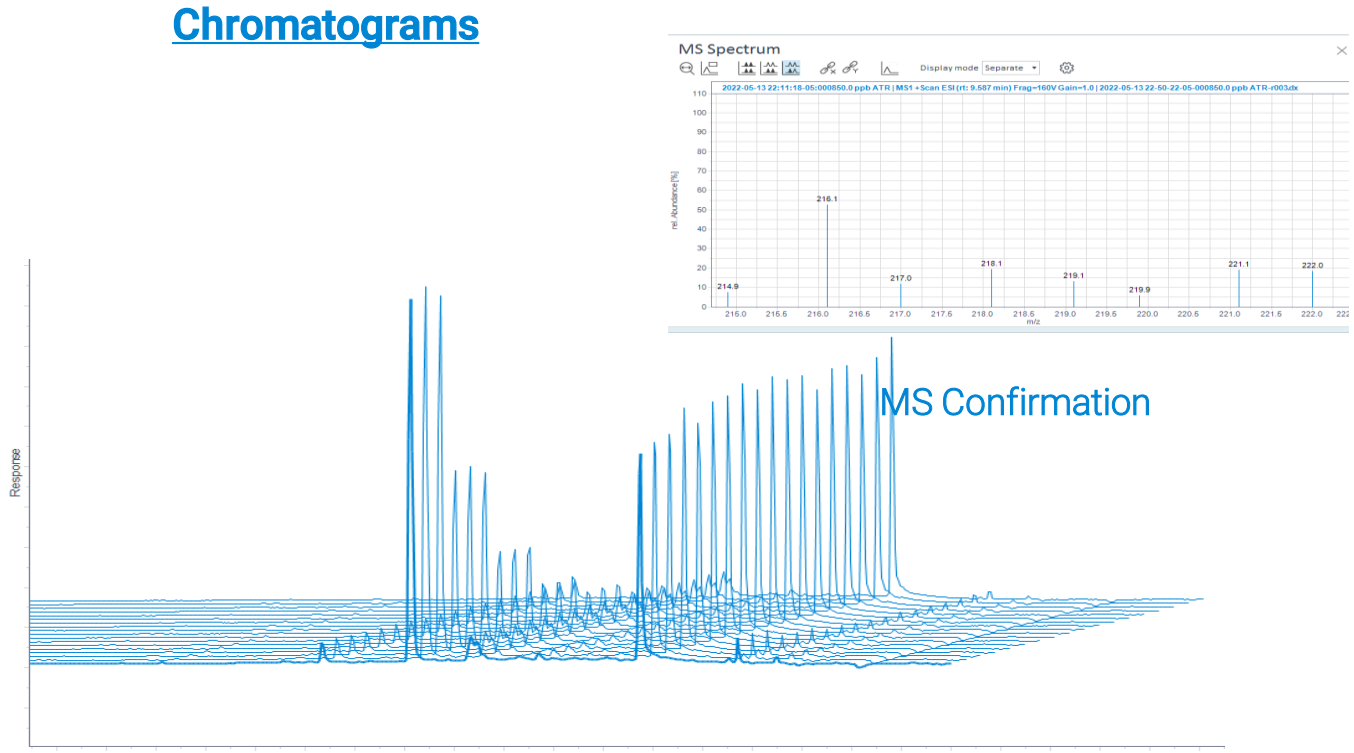
### Equipment

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.

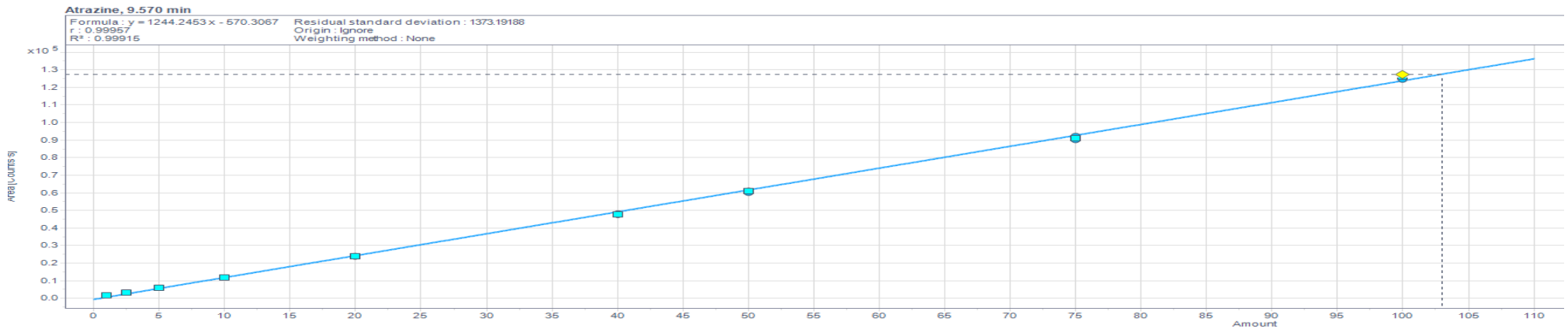
| Parameter | Settings |
|---|---|
| Analytical Column | Agilent Poroshell 120 EC-C18<br>3x150mm, 1.9 um<br>Part Number 693675-302 |
| Column Temperature | 30.0° C |
| Injection Volume | 1 uL |
| Run Time | 15.00 minutes |
| Post-run Time | 4.00 minutes |
| Mobile Phase Flow Rate | 0.5 mL/min |
| Mobile Phase A | Aqueous 0.1% formic acid,<br>5 mM ammonium formate |
| Mobile Phase B | Methanol |
| Gradient | Time (min) Flow (mL/min) %A %B<br>0.20 0.5 95.00 5.00<br>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

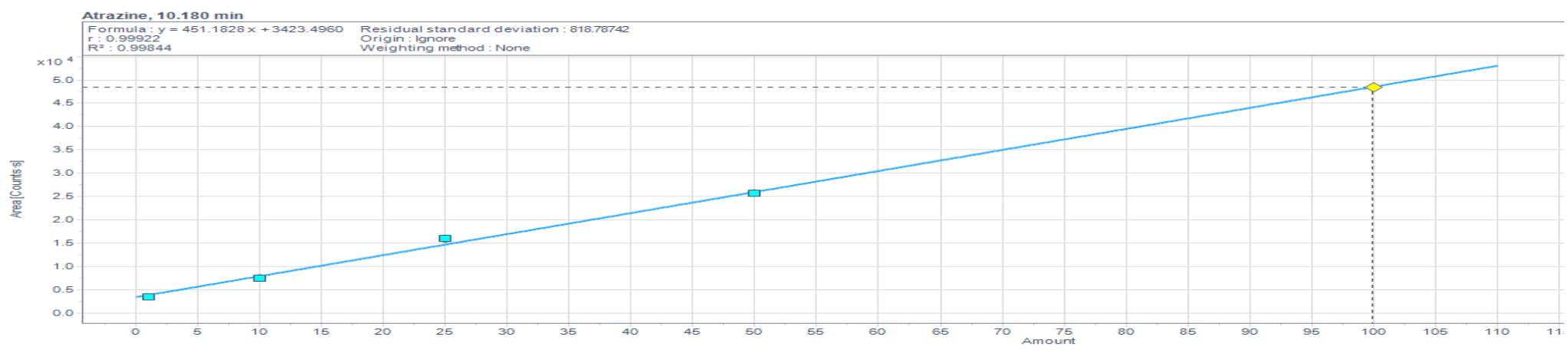
### Chromatograms



# Atrazine in Methanol Calibration Curve

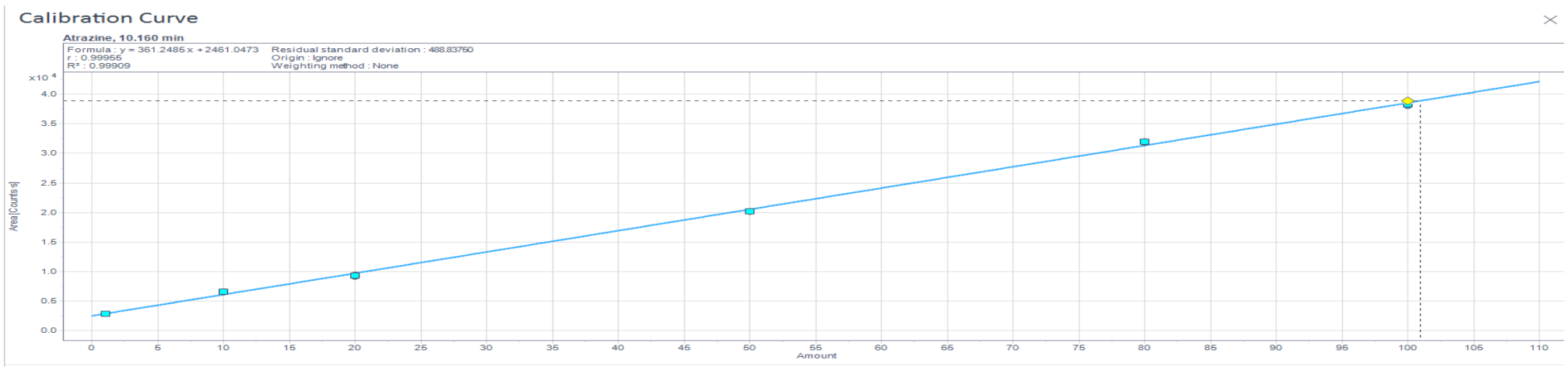



## Calibration Curve

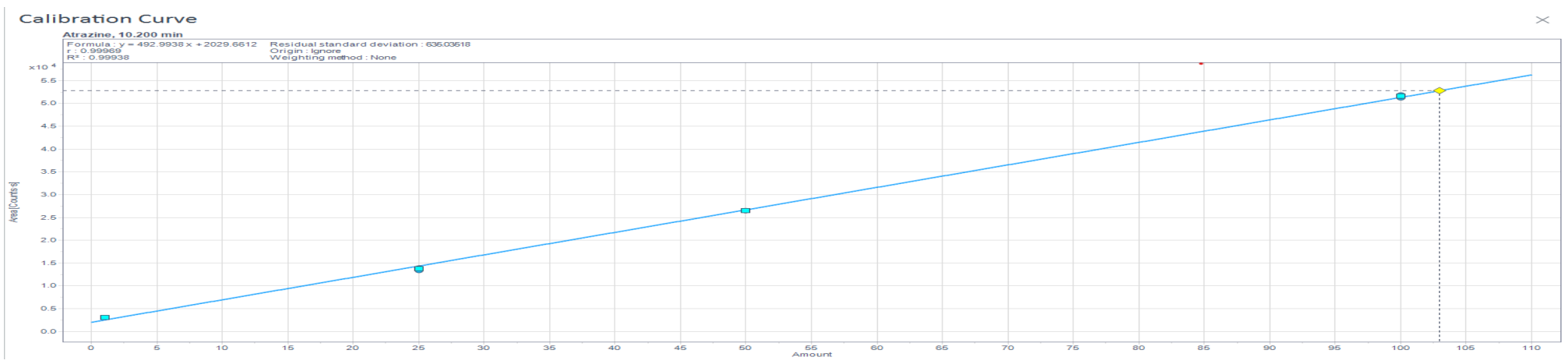



▷ Calibration table

## 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 |
| $R^2$ = | 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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