

# Fast Pesticide Residue Analysis Using a Novel Benchtop Time-of-Flight Mass Spectrometer

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## Introduction

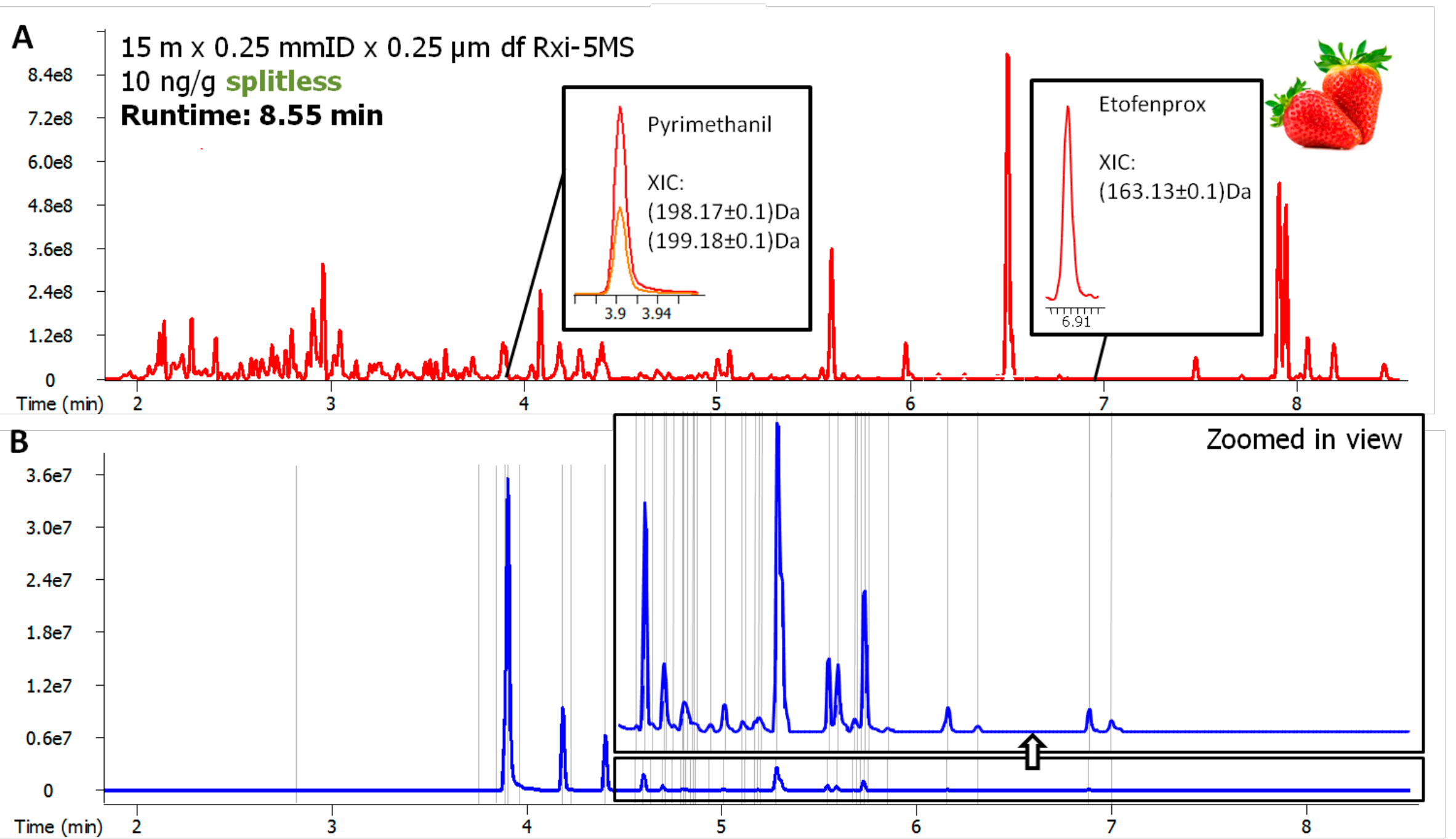
- One objective was to maximize throughput without introducing a significant number of additional chromatographic coelutions not separable by deconvolution, transitioning from a standard 30 m column to a 15 m column.
- LECO's proprietary deconvolution software, embodied as NonTarget Deconvolution™, was leveraged to maintain exceptional peak fidelity of the qualitative analysis, while the Target Analyte Find feature was utilized for robust quantitation and to establish method detection limits for organonitrogen pesticides spiked in QuEChERS strawberry extracts.

## GC Method for Fast Run Time

A bulk extract of strawberries purchased from a local grocery store was generated using methods described elsewhere—<http://www.restek.com/pdfs/GNAN1097A.pdf>. A dilution series from 5000 ng/g to 0.10 ng/g of GC Multiresidue Pesticide Mix #5 (Restek) in the bulk extract was prepared in duplicate for GC-MS analysis, as well as a raw extract unfortified and without cleanup to investigate the occurrence of incurred pesticides. The instrument conditions used are shown in the table below.

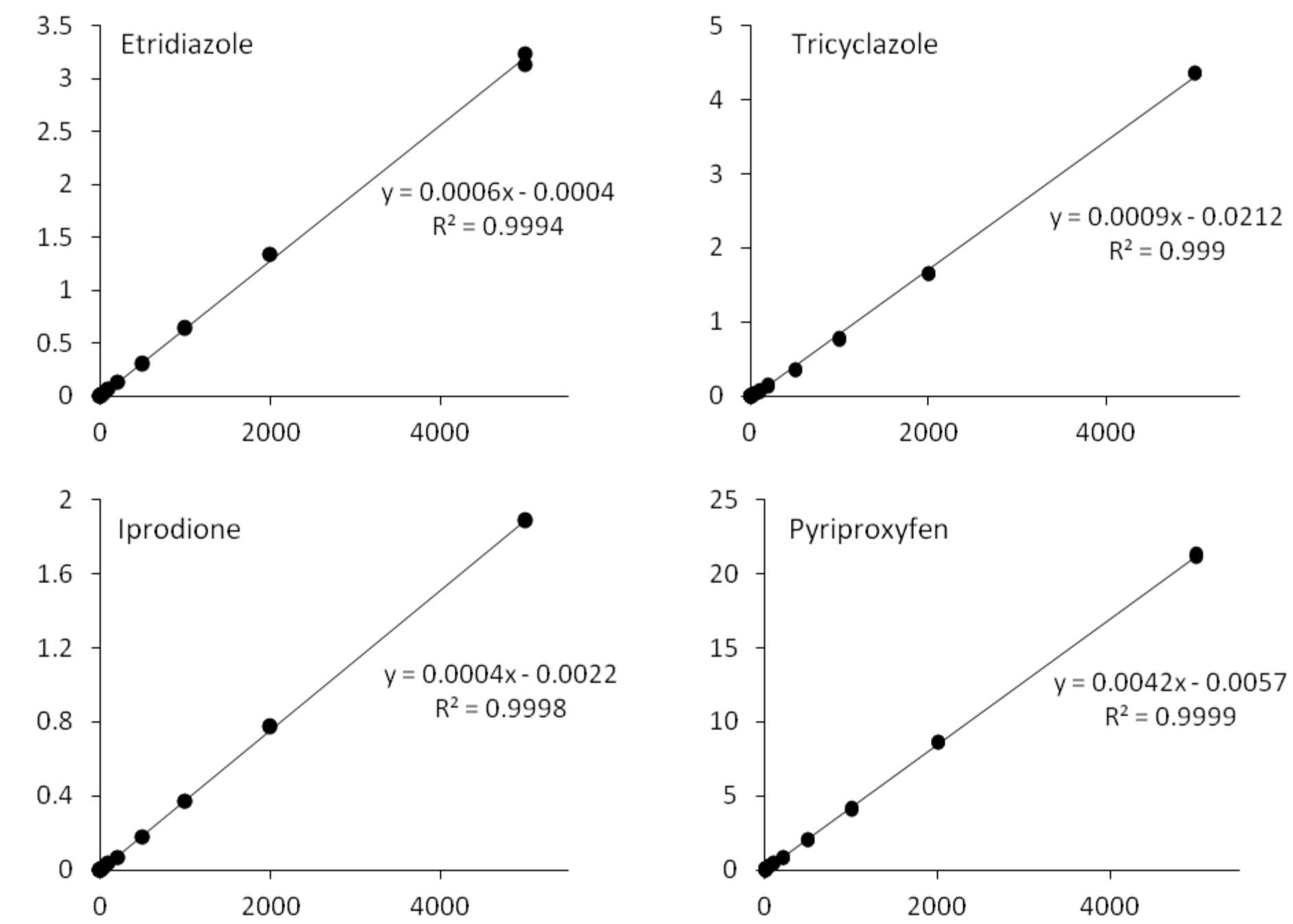
Gas Chromatograph	LECO L-PAL3 Autosampler, Agilent 7890B GC
Injection	1 µL pulsed splitless, 20 psi for 0.7min, GC injector @ 250°C
Carrier Gas	He @ 2.0 ml/min, Constant Flow
Column	Rxi-5ms, 15 m x 0.25 mmID x 0.25 µm df (Restek, Bellefonte, PA, USA)
Oven Program	70 °C (0.7 min), to 150 °C @ 60 °C/min, to 330°C @ 30 °C/min (0.5 min)
Transfer Line	300 °C
Mass Spectrometer	LECO Pegasus® BT
Ion Source Temperature	225 °C
Mass Range	45-650 m/z
Acquisition Rate	10 spectra/s

Analytical ion chromatograms (AIC) of a fortified strawberry QuEChERS extract: (A) for analytes reported using NonTarget Deconvolution (NTD) and (B) analytes reported using Target Analyte Find. The intense peaks in the target trace represent analytes that were incurred in the matrix in addition to the 10 ppb spiked.



## Excellent Linearity and Lower LODs in Matrix

Calibration curves for four representative pesticides in strawberry from their LOD to 5000 ng/g.



Calibration curve linearity and limits of detection for organonitrogen pesticides in strawberry from 0.10 to 5000 ng/g using Target Analyte Find on a Rxi-5ms, 15 m x 0.25 mm ID x 0.25 µm df column.

Name	CAS	R.T. (min)	R²	LOD	Units
Etridiazole	2593-15-9	2.818	0.9994	0.50	ng/g
Atrazine	1912-24-9	3.750	0.9992	0.20	ng/g
Terbutylazine	5915-41-3	3.843	0.9996	0.10	ng/g
Terbacil	5902-51-2	3.963	0.9995	0.10	ng/g
Vinclozoline	50471-44-8	4.225	0.9992	0.10	ng/g
MGK 264	113-48-4	4.635	0.9992	0.10	ng/g
MGK 264 isomer	113-48-4	4.708	0.9993	5.00	ng/g
Penconazole	66246-88-6	4.748	0.9999	0.10	ng/g
Fipronil	120068-37-3	4.793	0.9997	0.10	ng/g
Procymidone	32809-16-8	4.853	0.9998	0.20	ng/g
Paclobutrazol	76738-62-0	4.935	0.9994	0.10	ng/g
Flutriafol	76674-21-0	5.012	0.9996	0.10	ng/g
Fludioxonil	131341-86-1	5.100	0.9997	0.10	ng/g
Tricyclazole	41814-78-2	5.118	0.9990	1.00	ng/g
Myclobutanil	88671-89-0	5.165	0.9998	0.10	ng/g
Flusilazole	85509-19-9	5.183	0.9996	0.10	ng/g
Bupirimate	41483-43-6	5.198	0.9994	0.10	ng/g
Chlorfenapyr	122453-73-0	5.282	0.9991	0.10	ng/g
Lenacil	2164-08-1	5.602	0.9997	0.10	ng/g
Hexazinone	51235-04-2	5.675	0.9998	0.10	ng/g
Tebuconazole	107534-96-3	5.693	0.9998	0.10	ng/g
Propargite	2312-35-8	5.713	0.9991	2.00	ng/g
Iprodione	36734-19-7	5.848	0.9998	0.10	ng/g
Pyriproxyfen	95737-68-1	6.146	0.9999	0.10	ng/g
Fenarimol	60168-88-9	6.312	0.9998	0.20	ng/g
Etofenprox	80844-07-1	6.885	0.9996	0.10	ng/g
Fludioxonil	59756-60-4	6.998	0.9994	0.10	ng/g

Note: Captan, captafol, folpet, cyprodinil, pyrimethanil, triadimefon, triadimenol, and triflumizole were incurred in the strawberries, so their linearity and LOD were not reported even though they were spiked into the matrix and detected.

## Non-Target Full Mass Spectra All the Time

Analysis of 20 pg on column of bupirimate in strawberry on a 15 m x 0.25 mm ID x 0.25 µm df Rxi-5MS column.

