

Determination of Carbendazim in Orange Juice Using QuEChERS with LC/MS/MS Detection



UCT Part Numbers

ECQUEU750CT-MP

Pouch contains: 4000 mg MgSO_4 ,
1000 mg NaCl, 500 mg
Na citrate dibasic sesquihydrate
and 1000 mg Na citrate tribasic
dihydrate

CUMPSC18CT

2 mL centrifuge tube contains:
150 mg MgSO_4 , 50 mg PSA,
50 mg endcapped C18

Introduction:

The planar fungicide carbendazim (CASRN 10605-21-7) can be used to control mold on citrus crops but is not approved for use in the US or on imported products. Concentrations in citrus products can be rapidly and accurately determined using a QuEChERS extraction with dSPE cleanup. LOD and LOQ for this method are 0.4 and 1.4 ng/mL, respectively.

Procedure:

1. Extraction

- Add 10 mL of orange juice to a 50 mL centrifuge tube.
- Add 10 mL acetonitrile then vortex.
- Add the contents of **ECQUEU750CT-MP**.
- Shake vigorously for 1 min.
- Centrifuge at 5000 rpm for 5 min at 20 °C.
- Supernatant is ready for cleanup.

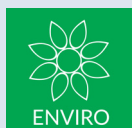
2. Dispersive Cleanup

- Add 1 mL of supernatant to **CUMPSC18CT** tube.
- Shake sample(s) for 1 min.
- Centrifuge at 10,000 rpm for 5 min.
- Transfer 0.5 mL to 2 mL autosampler vial.
- Add 25 μL 1 ppm TPP, vortex.
- Samples are ready for analysis.

3. LC/MS//MS Analysis



LC Conditions		
Instrumentation	Thermo Accela HPLC with autosampler	
Column	Guard column: Restek C18, 2.1 x 20 mm Column: Sepax HP-C18, 2.1 x 100 mm, 3 μm, 120 Å	
Column temperature	Ambient	
Injection volume	10 μL at 15 °C	
Mobile Phase	A: 0.1% formic acid in water B: 0.1 formic acid in methanol	
Flow Rate	200 μL/min	
LC Gradient Program		
Time (min)	% Mobile Phase A	% Mobile Phase B
0	50	50
3	0	100
8	0	100
9	50	50
14	50	50
MS Conditions		
Instrumentation	Thermo TSQ Vantage MS	
Ion source	Heated ESI	
Ion polarity	ESI ⁺	
Spray voltage	3000 V	
Sheath gas pressure	N ₂ @ 40 psi	
Auxiliary gas pressure	N ₂ @ 10 psi	
Ion transfer capillary temperature	350 °C	
Scan type	SRM (0-10 min)	
CID conditions	Ar @ 1.5 mTorr	



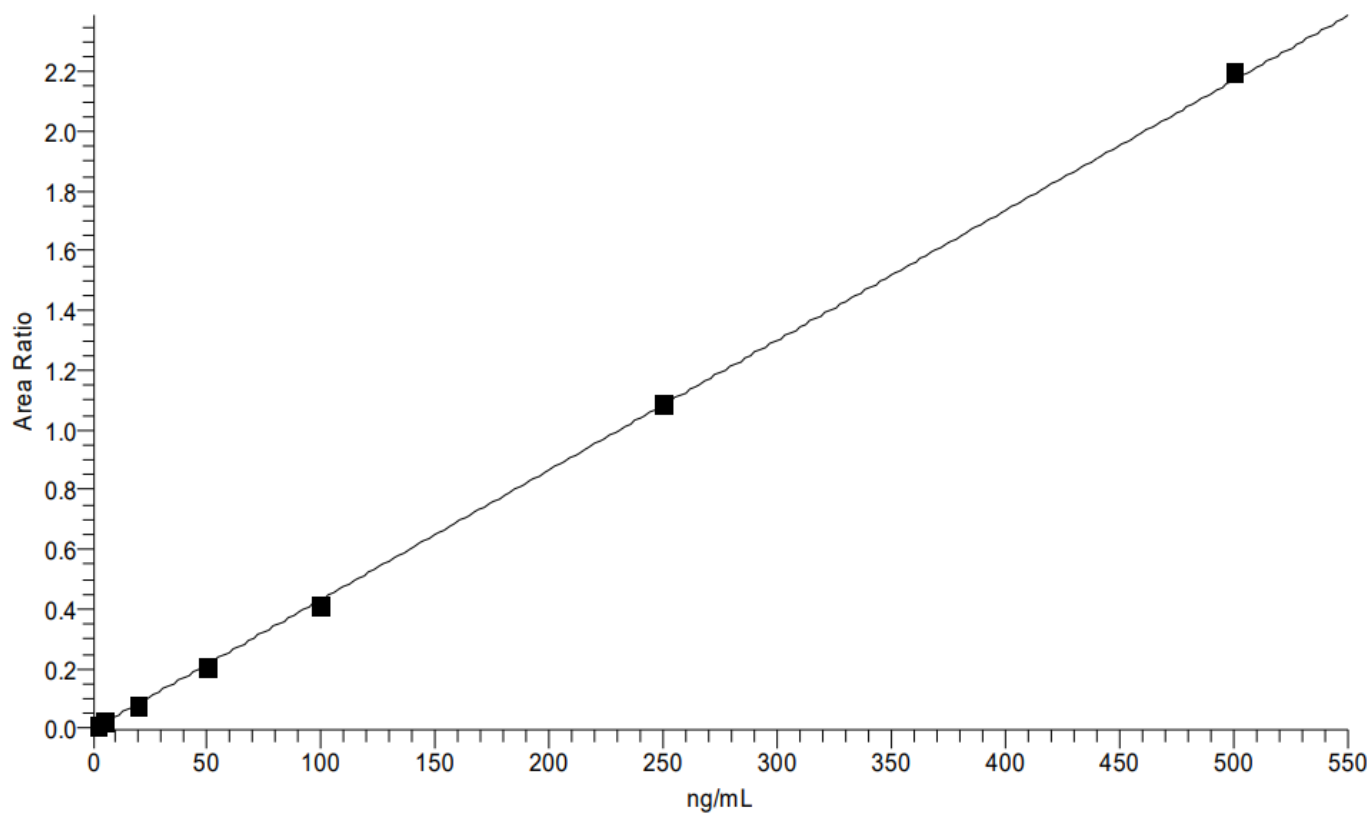
SRM Transitions							
Compound	Parent	Product ion 1	CE	Product ion 2	CE	S-Lens	Dwell time (s)
Carbendazim	192.093	132.080	29	160.080	17	81	0.20
TPP (IS)	327.093	77.020	37	152.070	33	98	0.10

Matrix Matched Calibration Curve

Dynamic linearity range is from 2 to 500 ng/mL with $R^2=0.9992$

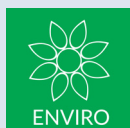
Carbendazim

$$Y = -0.00137422 + 0.00434038 \cdot X \quad R^2 = 0.9992 \quad W: 1/X$$

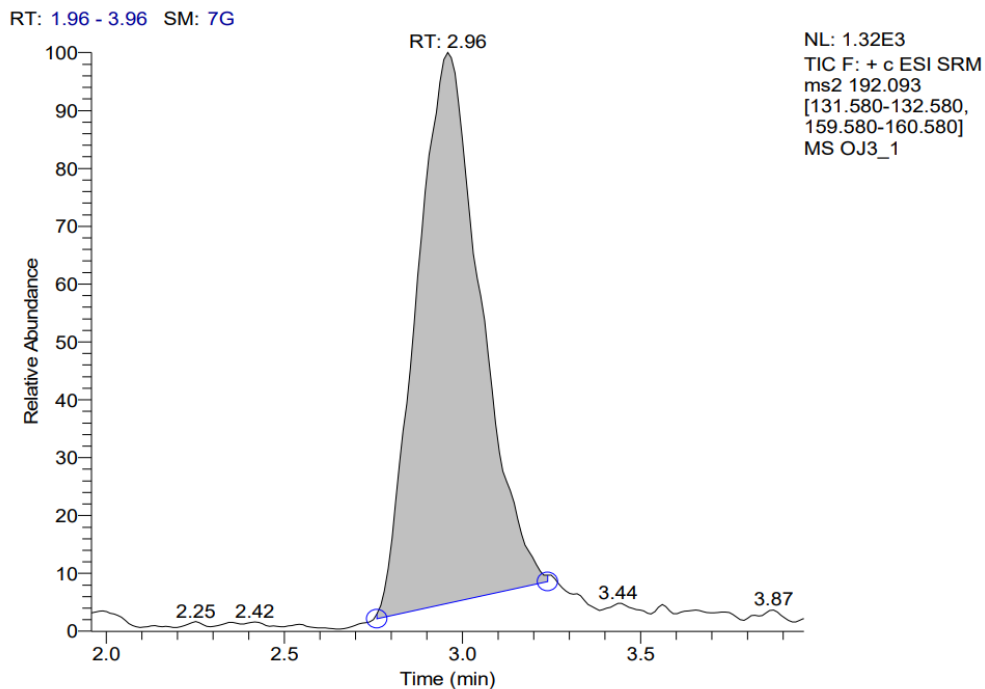


Accuracy and Precision of Carbendazim Data from Spiked Orange Juice Sample

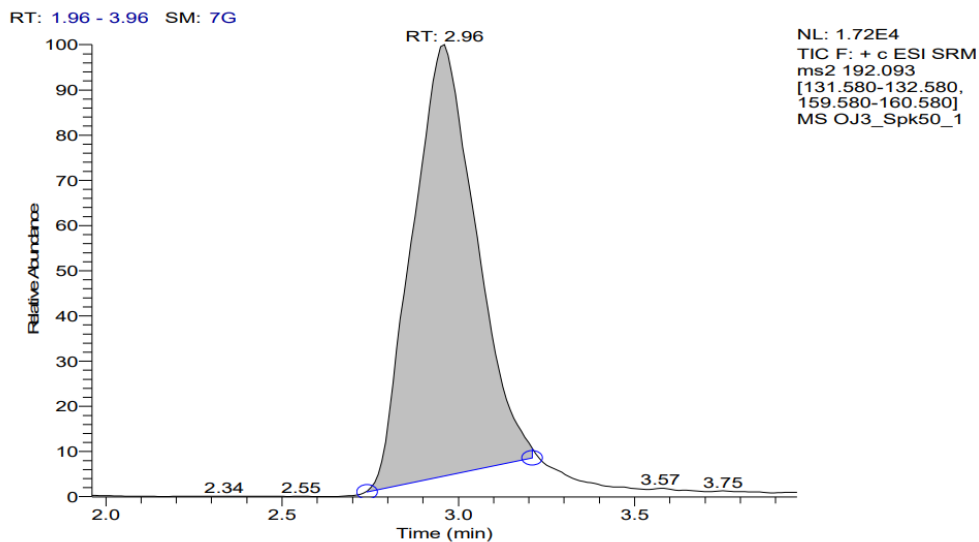
Fortified (ng/mL)	Recovery %	RSD % n=4
10	96.6	4.5
50	100.2	3.4
250	103.7	2.1



Chromatogram of Orange Juice Sample and Fortified at 50 ng/mL



50 ng/mL Fortified



DCN-212020-230

UCT, LLC • 2731 Bartram Road • Bristol, PA 19007 800.385.3153 • 215.781.9255

www.unitedchem.com Email: methods@unitedchem.com

©UCT, LLC 2023 • All rights reserved

