



The Food & Environment  
Research Agency



# Comparison of instrument response in different matrices: An investigation into matrix effects

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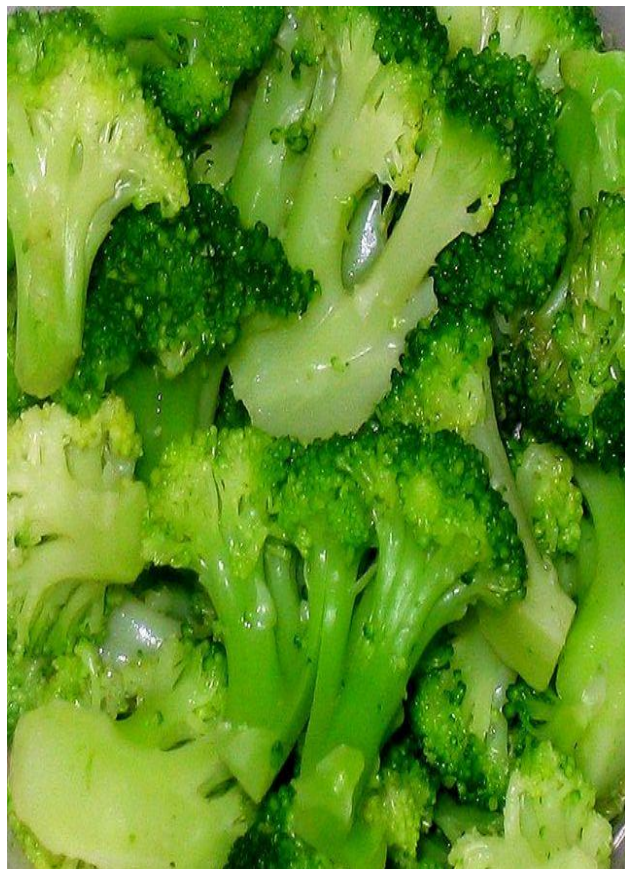


## Background

- Matrix effects are well known
- Matrix matched calibration used to compensate for matrix effects using
  - Exact match
  - Exact match but different variety
  - Similar type
  - Generic matrix



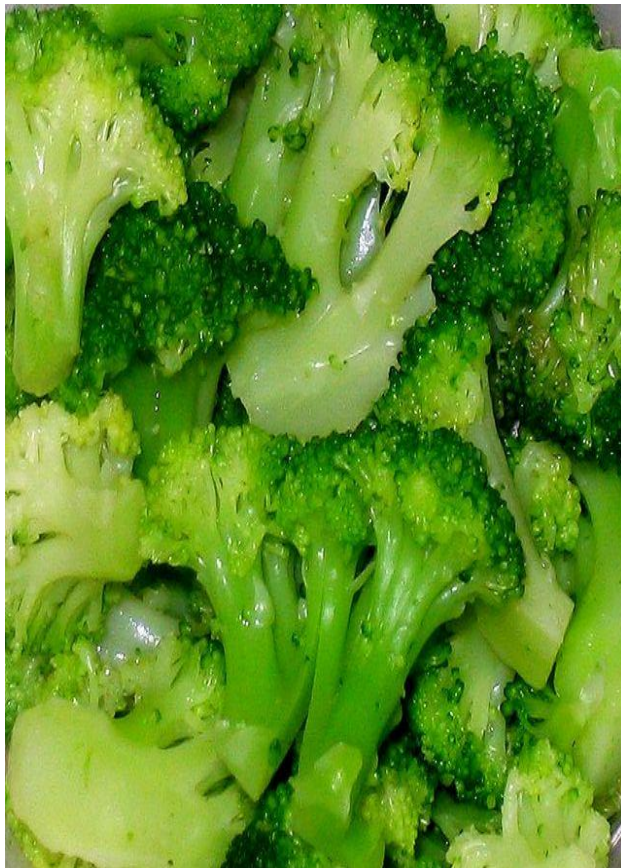
# FAPAS Broccoli



	<b>z-scores</b>
carbaryl	-1
<b>chlorpyrifos-methyl</b>	<b>-2.6</b>
deltamethrin	-0.7
fluazifop-p-butyl	-1.3
gamma-HCH	-1.4
<b>imidacloprid</b>	<b>-3.4</b>
<b>isofenphos-methyl</b>	<b>-2.6</b>
thiacloprid	-1.2



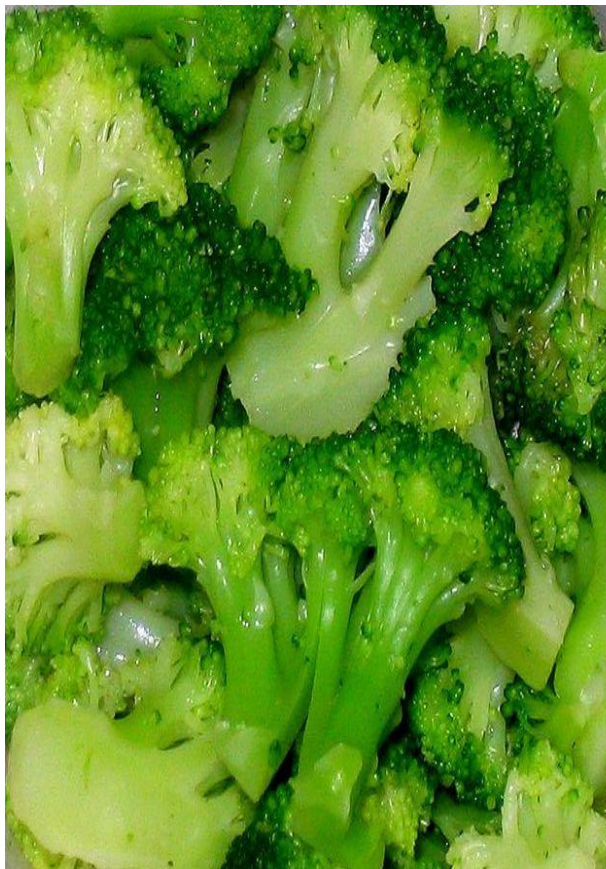
# FAPAS Broccoli



	z-scores	Follow Up
carbaryl	-1	
<b>chlorpyrifos-methyl</b>	<b>-2.6</b>	<b>0.7</b>
deltamethrin	-0.7	
fluazifop-p-butyl	-1.3	
gamma-HCH	-1.4	
<b>imidacloprid</b>	<b>-3.4</b>	<b>0.8</b>
<b>isofenphos-methyl</b>	<b>-2.6</b>	<b>1.2</b>
thiacloprid	-1.2	



# FAPAS Broccoli



carbaryl	-1	-0.7	-1.5	<b>-4.5</b>
chlorpyrifos-methyl	<b>-2.6</b>	-1.9	-1.5	-1.6
deltamethrin	-0.7	-0.6	-0.5	-1.1
fluazifop-p-butyl	-1.3	<b>-2.3</b>	-1.6	<b>NA</b>
gamma-HCH	-1.4	-1.9	<b>-2.3</b>	<b>NA</b>
imidacloprid	<b>-3.4</b>	1.3	-0.7	-0.9
isofenphos-methyl	<b>-2.6</b>	<b>-2.4</b>	<b>-2.2</b>	<b>-2.7</b>
thiacloprid	-1.2	-0.2	-1.3	-0.6



# Difficult matrix

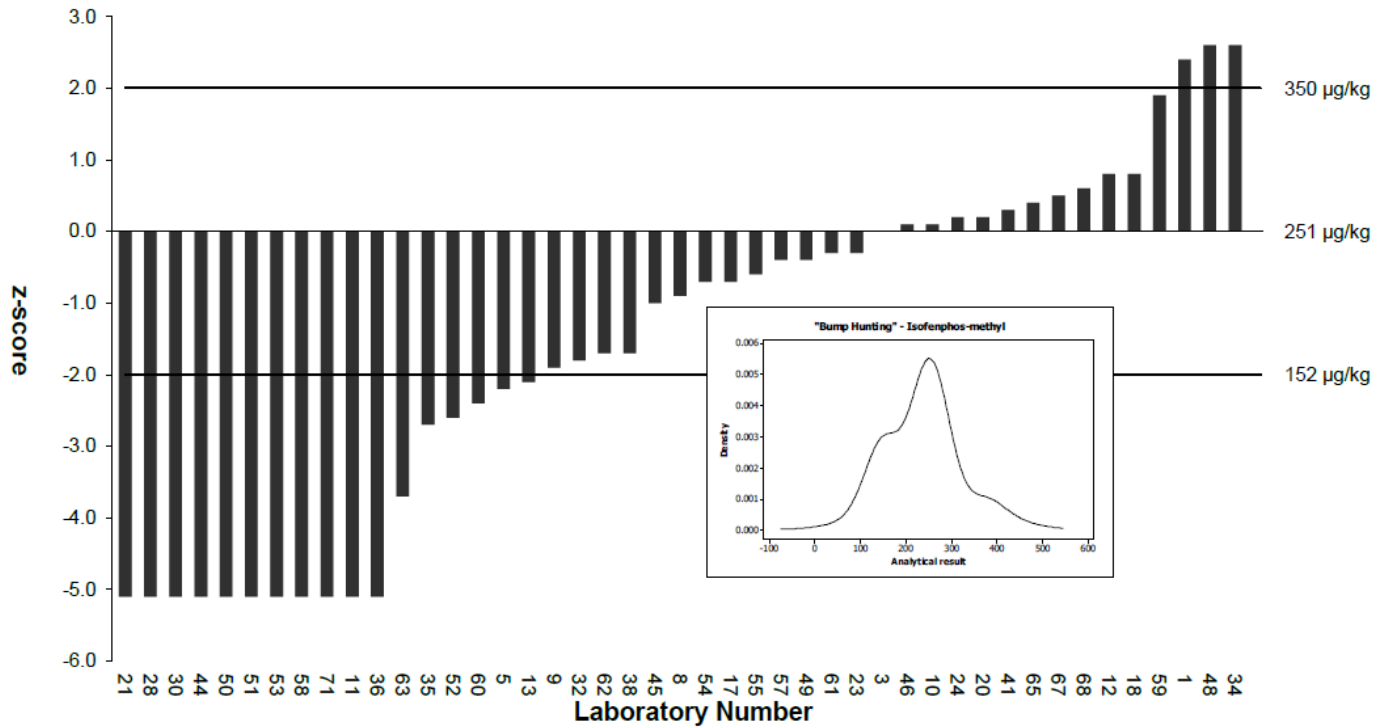
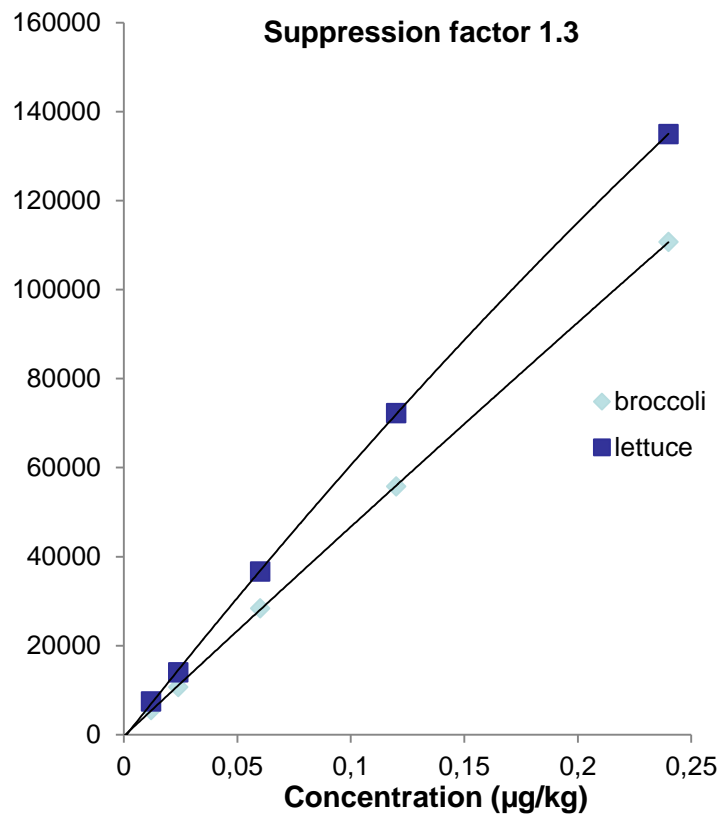


Figure 7: z-Scores for Isufenphos-methyl

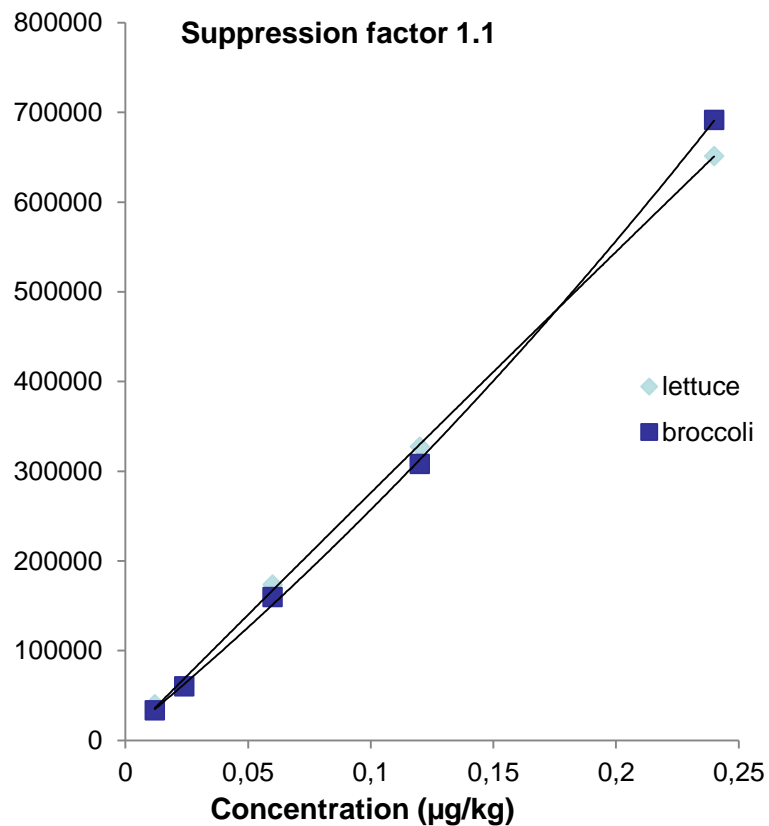
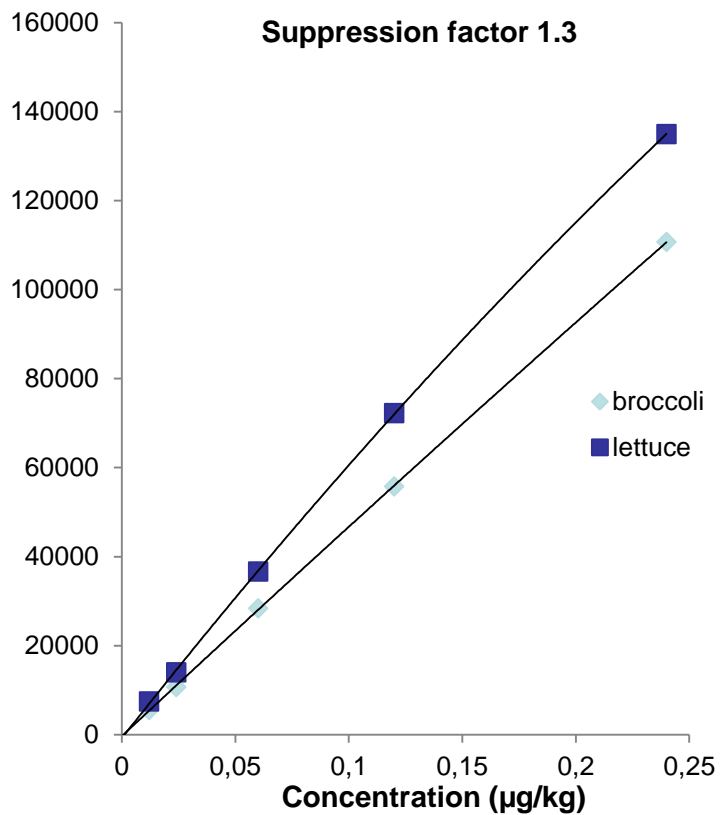


# Further investigations (chlorpyrifos-methyl)





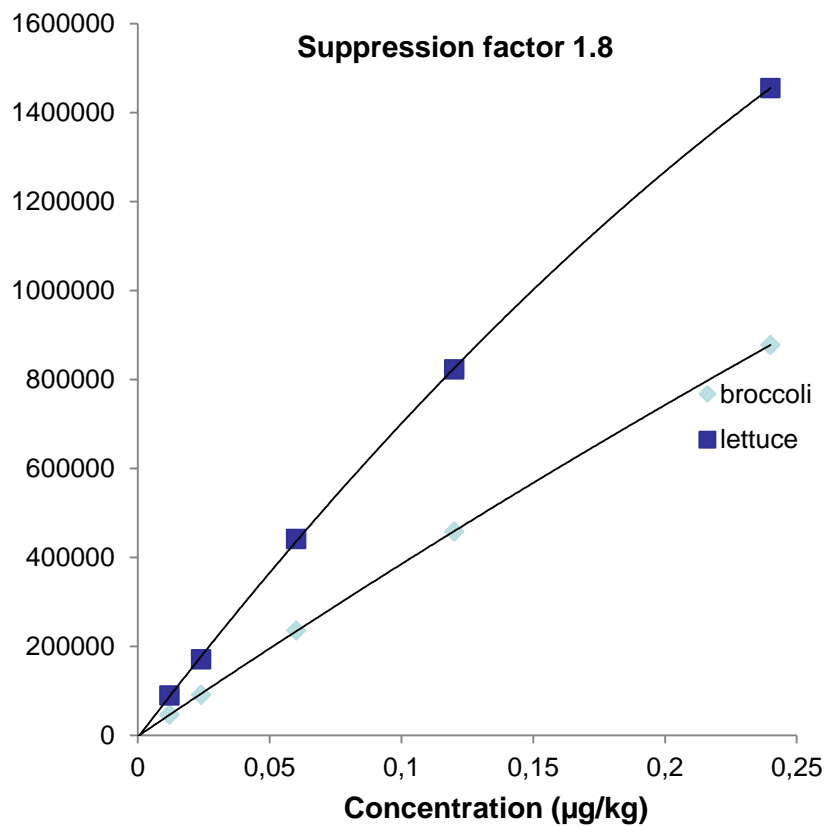
# Further investigations (chlorpyrifos-methyl)





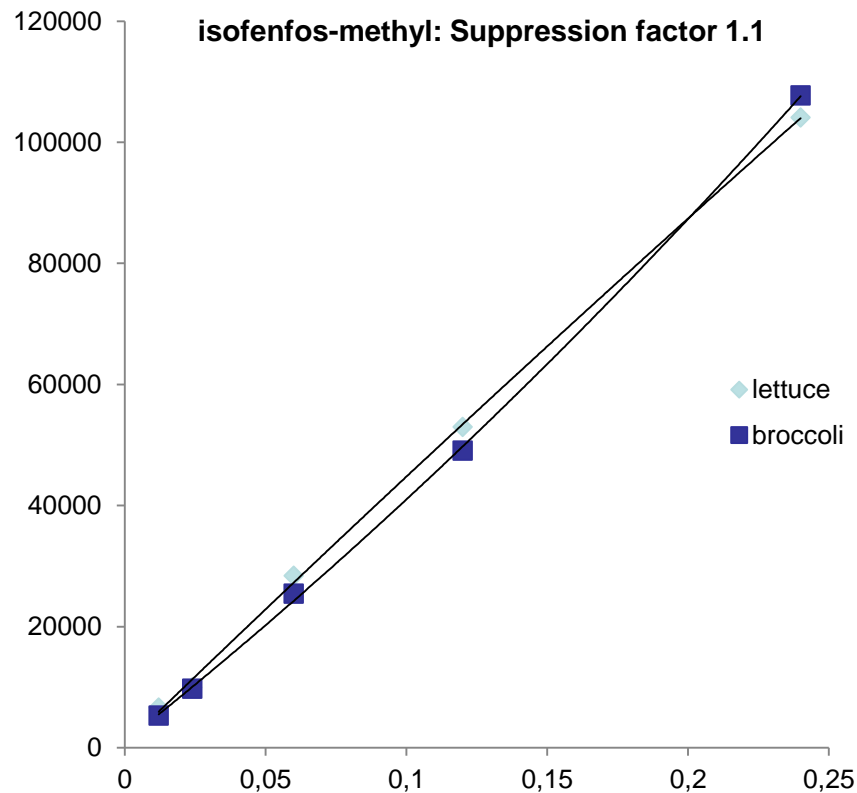
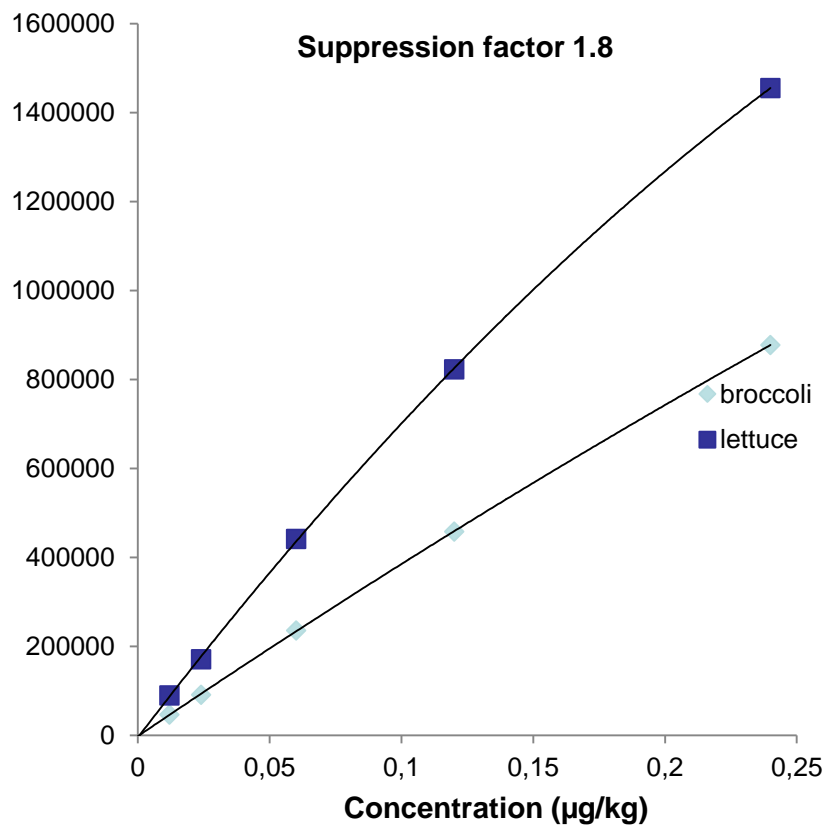


# Further investigations (isofenfos-methyl)



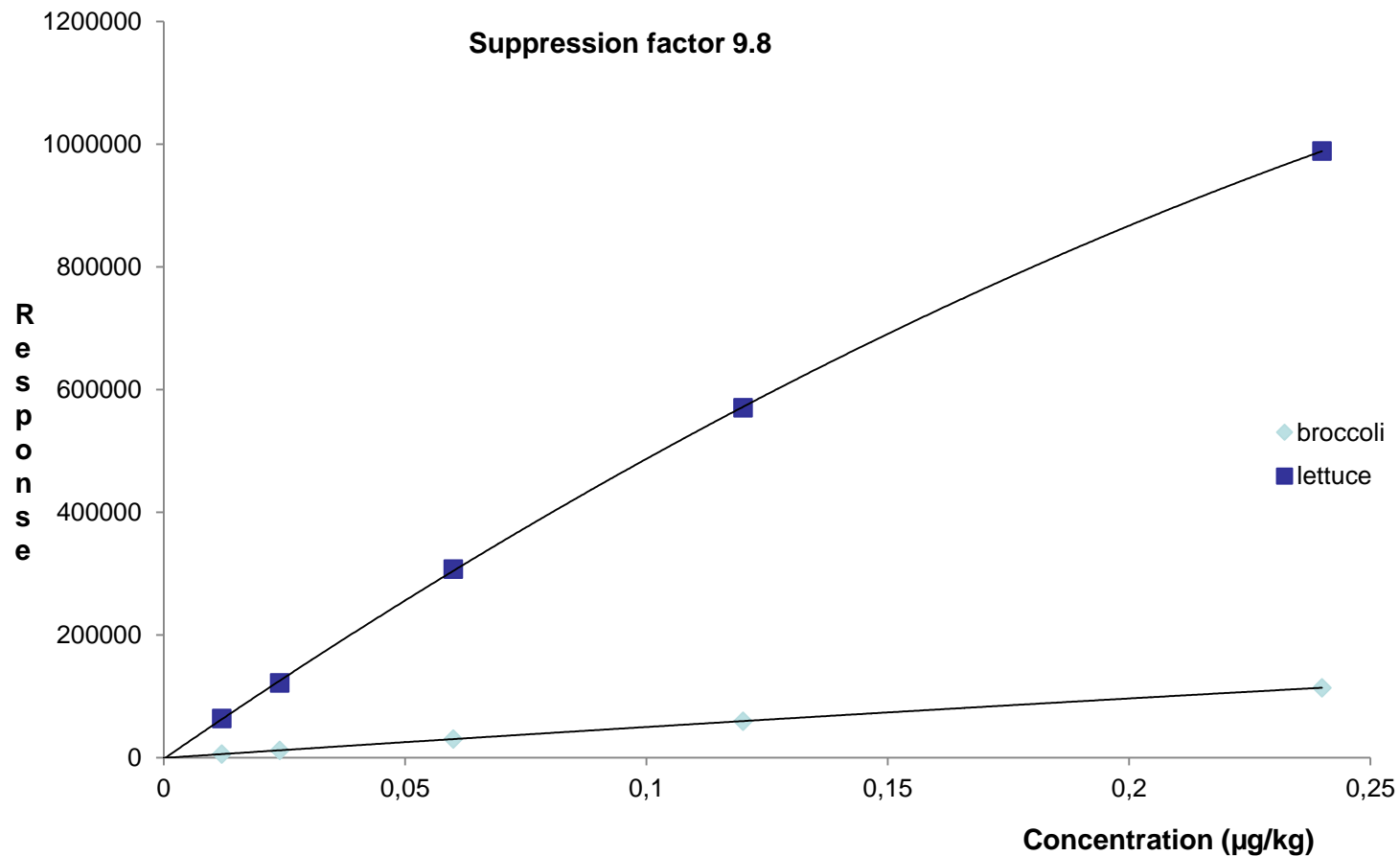


# Further investigations (isofenfos-methyl)



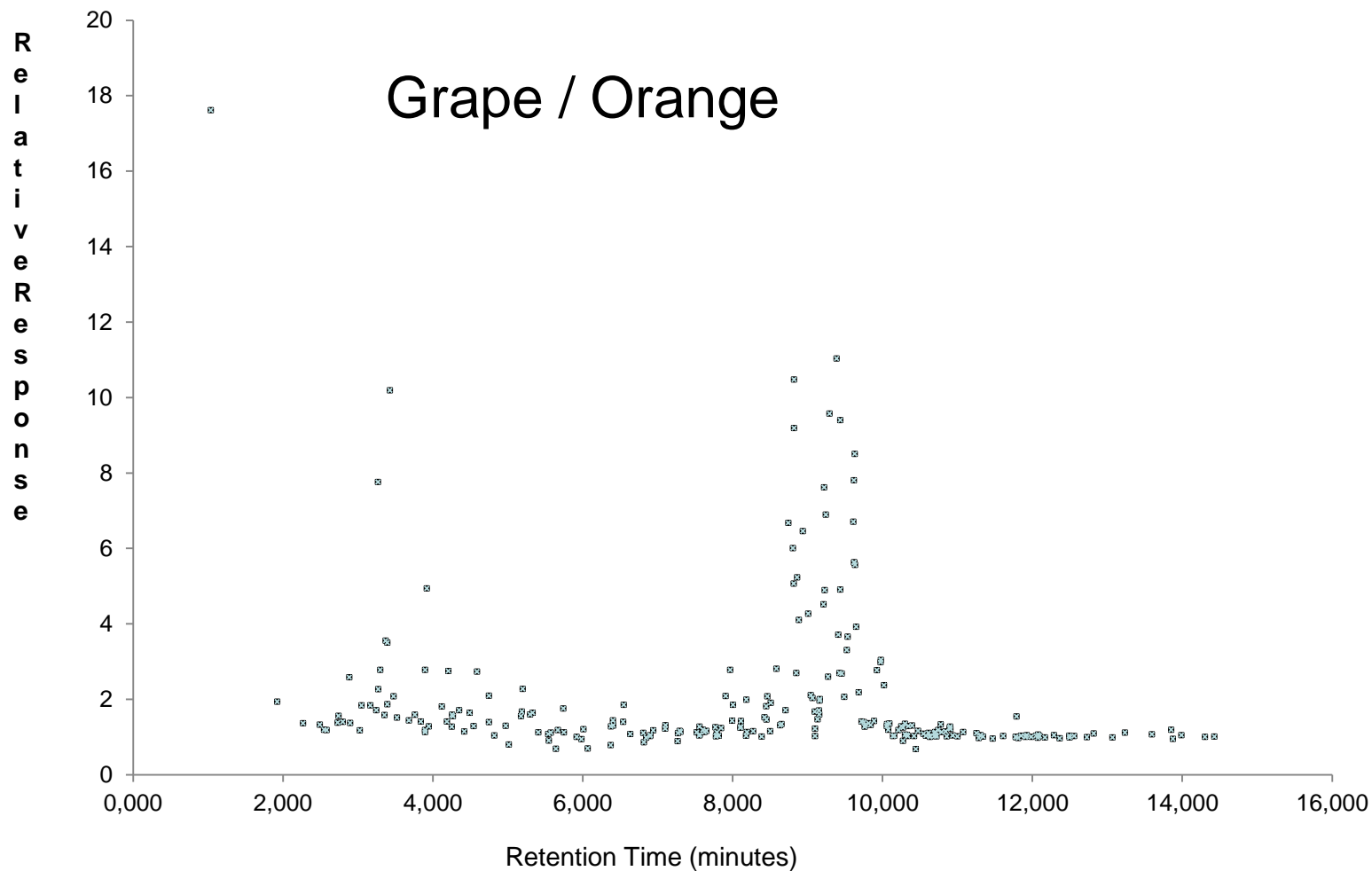


# Further investigations (imidacloprid)



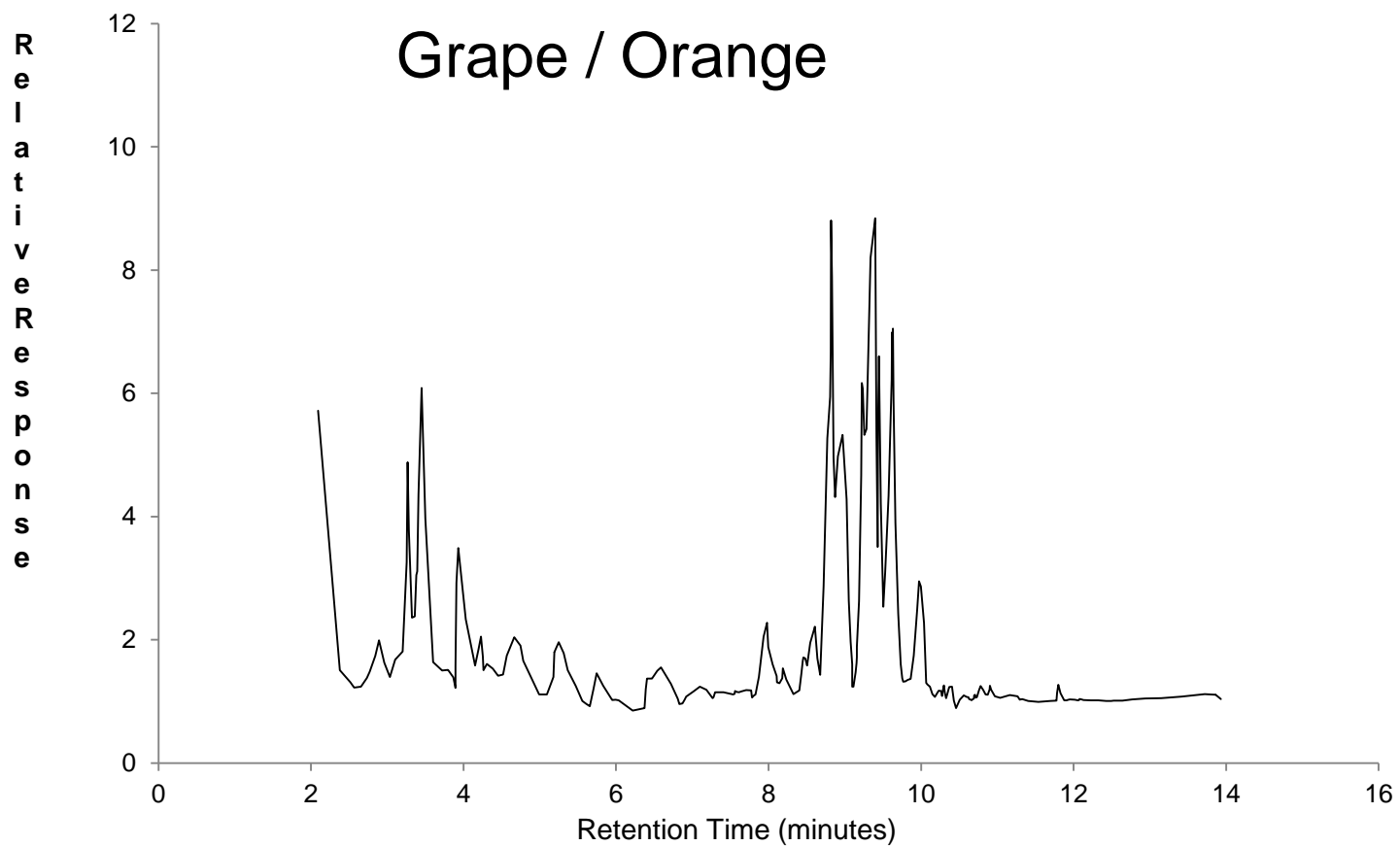


# Matrix effects at different RTs



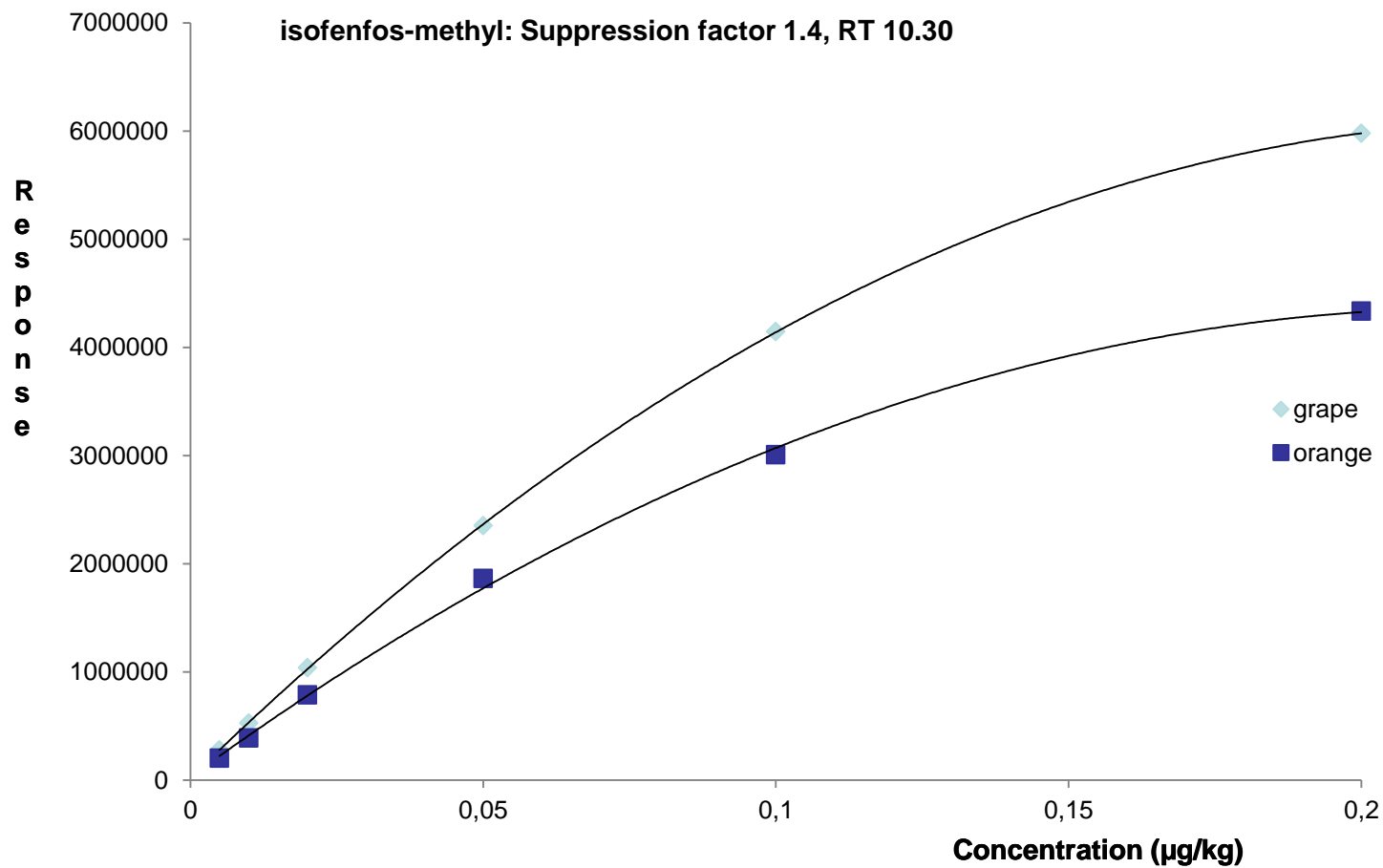


# Matrix effects at different RTs



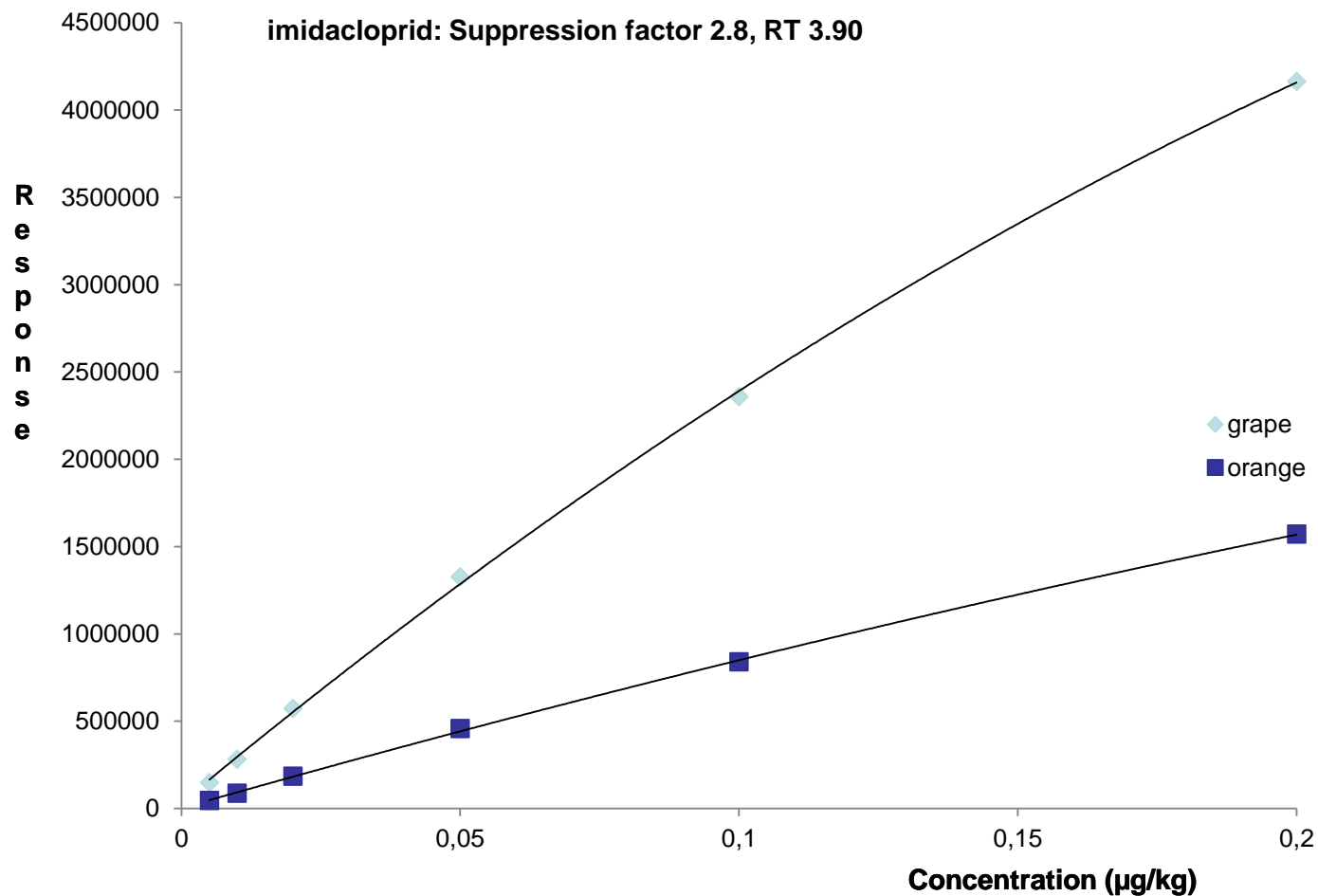


# Grape v Orange



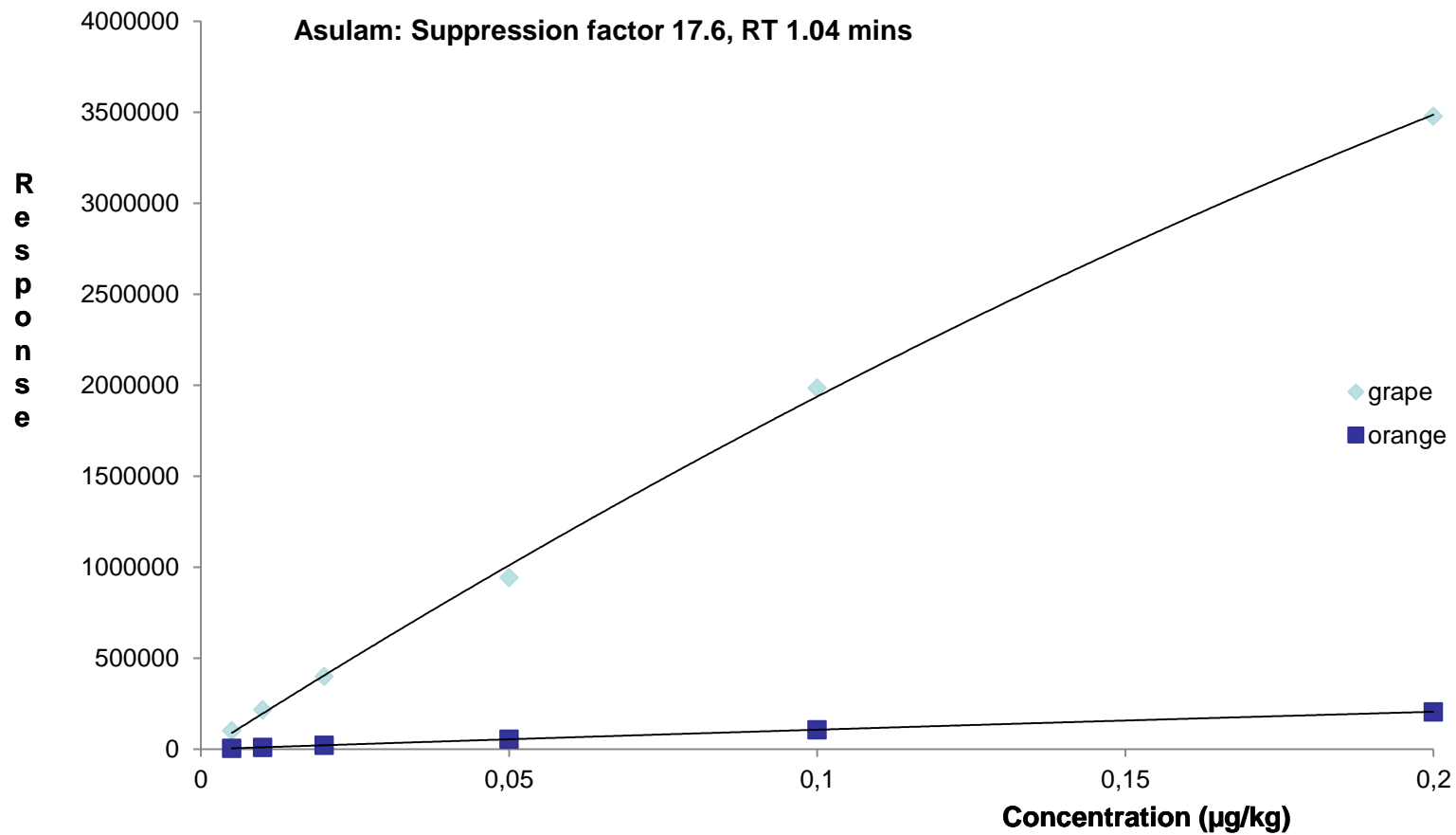


# Grape v Orange





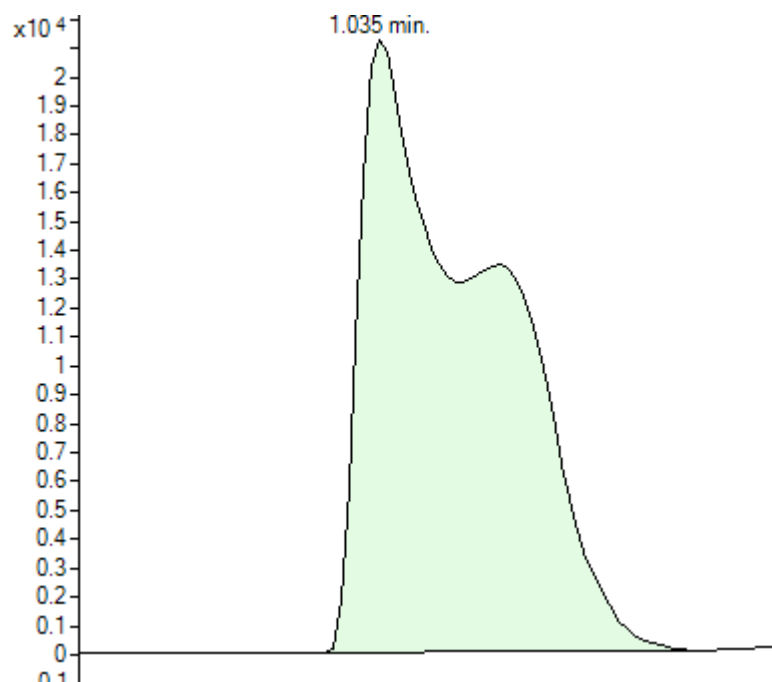
# Grape v Orange



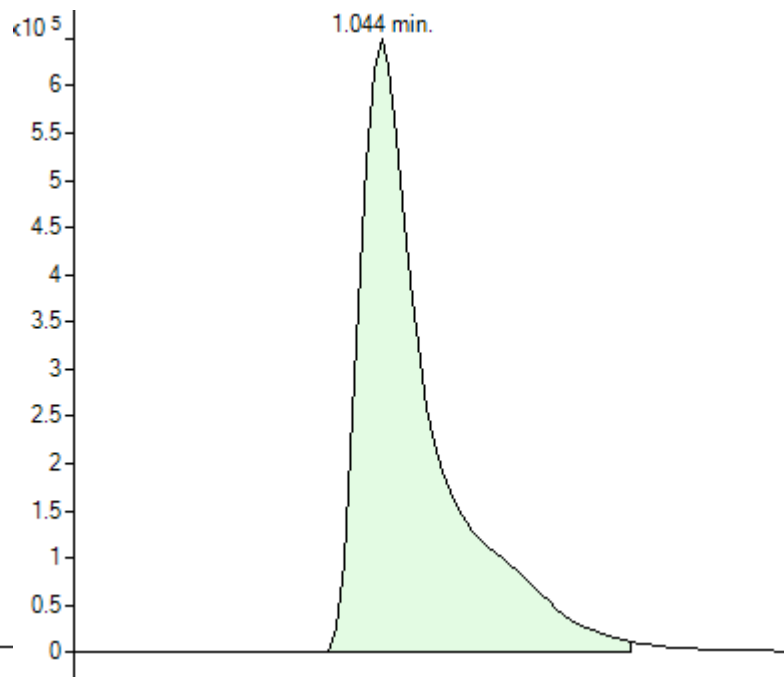




# Grape v Orange (asulam peak shape)



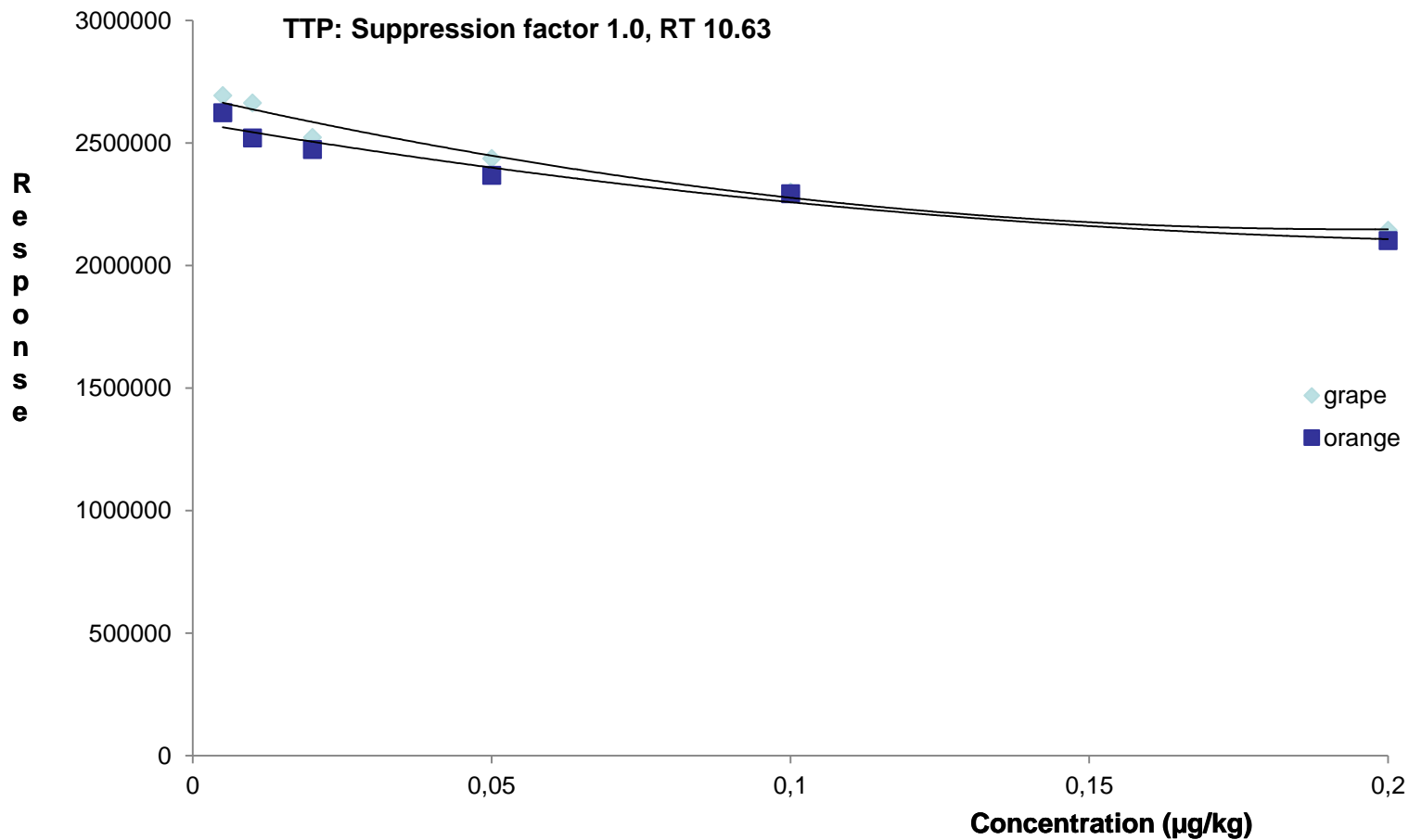
Orange



Grape



# Grape v Orange





## Conclusions

- Matrix effects – poor quantification
- Matrix effects more pronounced in LC
- Inconsistent RT and peak shape on GC
- Generic internal standard do not correct for matrix effects
- Poor matrix matching acceptable for screening?
- Dilute to minimise matrix effects



## Conclusions (Further work)

- **Compare calibration regimes**
  - Solvent
  - a commonly used 'generic' matrix
  - similar matrix extract (same commodity)
  - an exact matrix-match extract
  - standard addition
- **Assess**
  - cocktail effects
  - use of internal standards e.g. TPP
  - use of dilution to reduce matrix effects



# Acknowledgements:

My colleagues in pesticides residues and LCMS teams

Thank you for your attention