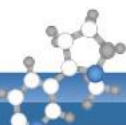# Current Challenges in the Analysis of Copper Pesticide Residues

E. Eichhorn[1], Ann-Kathrin Schäfer[1], Susanne Maier[2], Jörg Rau[2], M. Anastassiades[1]

1) **European Union Reference Laboratory for Pesticides requiring Single Residue Methods**, located at the Chemical and Veterinary Analysis Agency (CVUA) Stuttgart, Fellbach, Germany

2) **Laboratory for elemental analyses**, located at the Chemical and Veterinary Analysis Agency (CVUA) Stuttgart, Fellbach, Germany

L 95/28 | EN | Official Journal of the European Union | 4.4.2023

EU-MACP

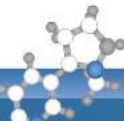COMMISSION IMPLEMENTING REGULATION (EU) 2023/731

of 3 April 2023

concerning a coordinated multiannual control programme of the Union for 2024, 2025 and 2026 to ensure compliance with maximum residue levels of pesticides and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin and repealing Implementing Regulation (EU) 2022/741
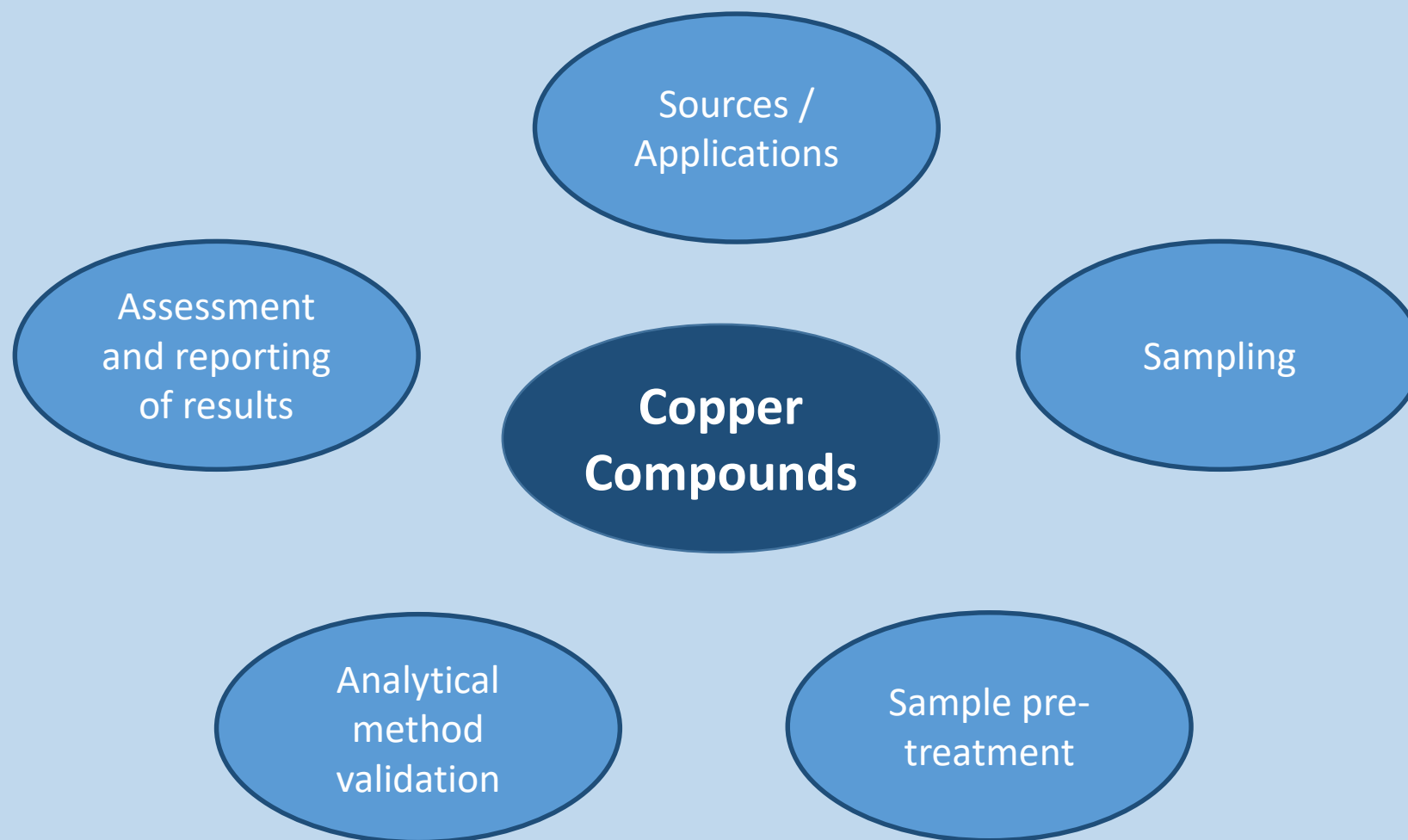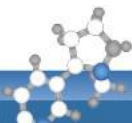
PART C

Pesticide residue/product combinations to be analysed in/on products of plant origin

	2024	2025	2026	Remarks
Clofentezine	(b)	(c)	(a)	
Clopyralid	(b)	(c)	(a)	
Clothianidin	(b)	(c)	(a)	
Copper compounds	(b)	(c)	(a)	
Cyantraniliprole	(b)	(c)	(a)	
Cyazofamid	(b)	(c)	(a)	
Cyflufenamid	(b)	(c)	(a)	

Copper Compounds| Challenges

Sources / Applications

Assessment and reporting of results

Copper Compounds

Sampling

Analytical method validation

Sample pre-treatment
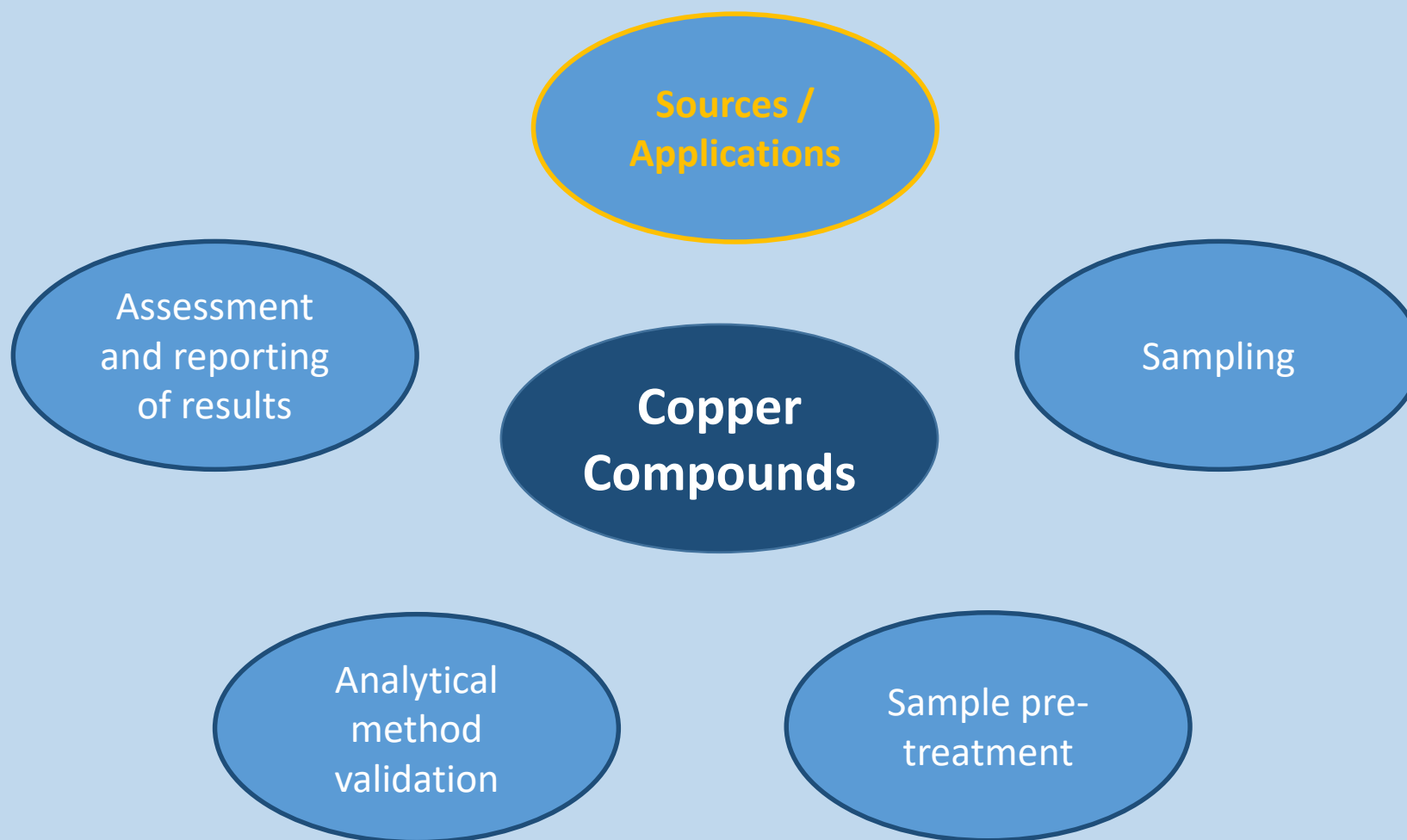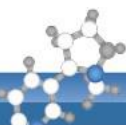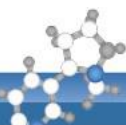
Copper Compounds| Sources and Applications 1

- **antimicrobial agent**, especially against fungi and bacteria

    − **non-dietary sources**: personal care products, biocides, veterinary medicine,….

    − use as a **pesticide**

Copper Compounds| Sources and Applications 2

USE AS A <u>PESTICIDE</u>:

- approved pesticide active substances according to Reg. (EC) No. 1107/2009

  – Bordeaux mixture*

  – Copper hydroxide

  – Copper oxide   Residue definition according to Reg. (EU) No. 396/2005:
                          Copper Compounds

  – Copper oxychloride

  – Tribasic copper sulphate

  ➢ various applications on fruits, vegetables and cereals

  ➢ application also approved in organic production according to VO (EU) 2021/1165

- component of other a.s.'s:

  – Mancopper (manganese and copper salt of ethylene-bis-dithiocarbamate)

  – Oxine Copper (Copper salt of 8-Hydroxyquinoline)

> * Bordeaux mixture:
> Mixture of **copper**sulfate
> & calcium oxide

Copper Compounds| Sources and Applications 3

- **antimicrobial agent**, especially against fungi and bacteria

    – **Non-dietary sources**: personal care products, biocides, veterinary medicine,….
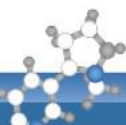
    – Use as a **pesticide**

- **Essential micro-nutrient** for all living organisms as a component of enzymes

    – **feed additive** for all species (Reg. (EC) No. 1334/2003), e.g. 35 mg Cu/kg feeding stuff for bovines

    – **additive in infant and follow-on formulae as well as baby food**

    – **food additives**: component of the pigments Cu-chlorophyll (E 141i) and –chlorophyllin (E 141ii)

    – component in **fertilisers**

        ➢ potential gradual enrichment of copper in the soil and therefore in food crops

        ➢ limitation: Max. 28 kg of copper per hectar over a period of 7 years (as PPP)
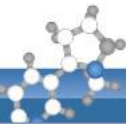
Copper Compounds| Current practice 1
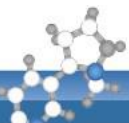
Finding copper?!
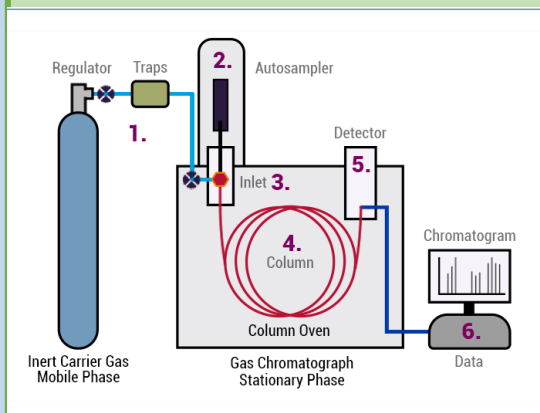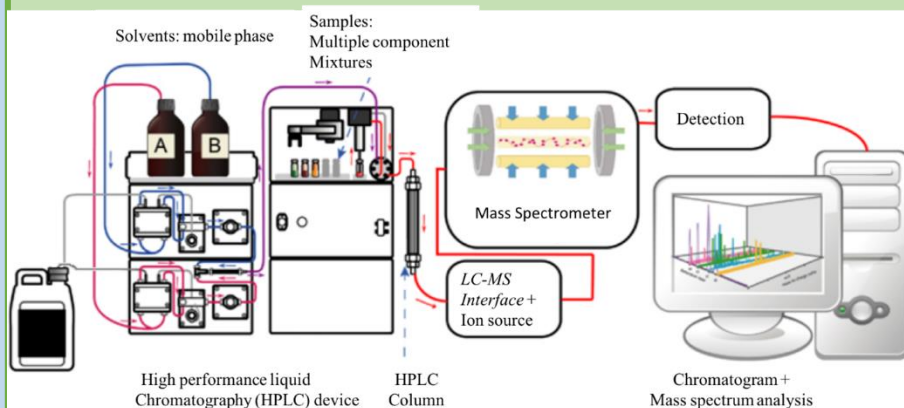
Copper Compounds| Current practice 1

Finding copper?!

usual analytical equipment in a pesticide lab

https://blog.perkinelmer.com/posts/gas-chromatography-explained-what-it-is-and-how-it-works/

GC-MS(/MS), -HR-MS

https://www.technologynetworks.com/analysis/articles/lc-ms-what-is-lc-ms-lc-ms-analysis-and-lc-msms-348238

LC-MS/MS, -HR-MS

Copper Compounds| Current practice 1

Finding copper?!

usual analytical equipment in a pesticide lab
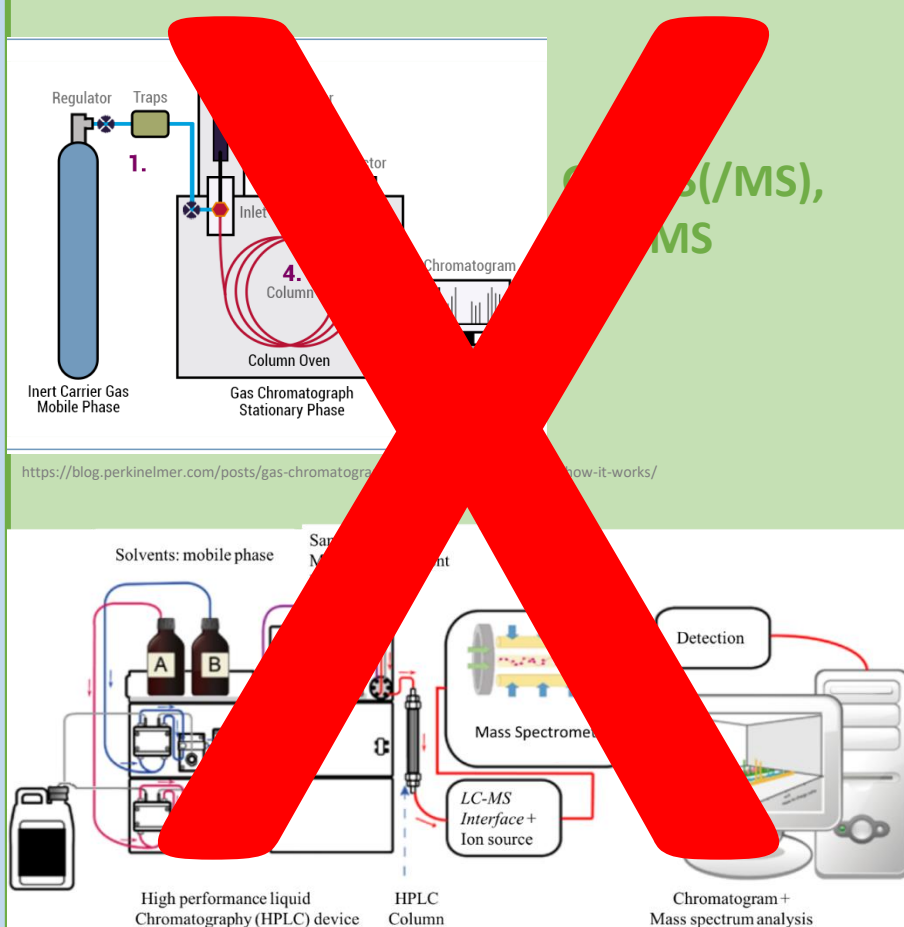
usual analytical equipment in a contaminant/heavy metal lab

GC-MS(/MS), MS

https://blog.perkinelmer.com/posts/gas-chromatography-how-it-works/

LC-MS/MS, -HR-MS

https://www.technologynetworks.com/analysis/articles/lc-ms-what-is-lc-ms-lc-ms-analysis-and-lc-msms-348238

Microwave digestion

Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)

https://www.agilent.com/en/product/atomic-spectroscopy/inductively-coupled-plasma-mass-spectrometry-icp-ms/what-is-icp-ms-icp-ms-faqs/
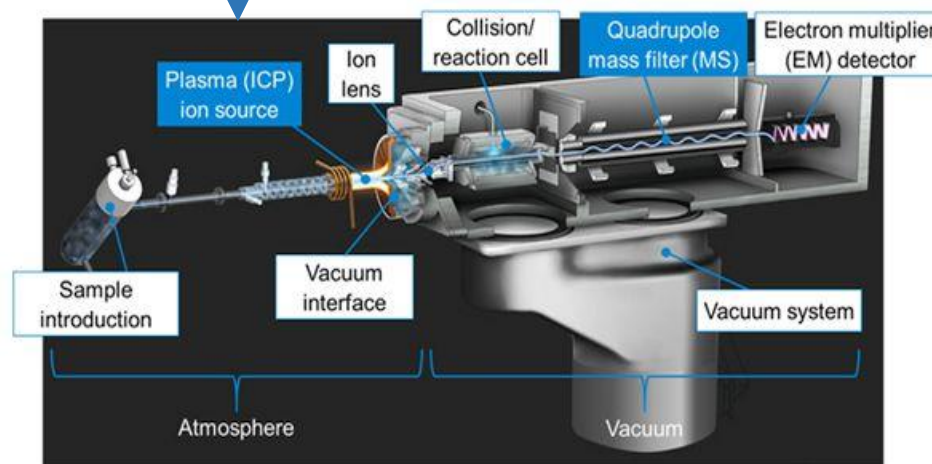
Copper Compounds| Current practice 2

EU-wide OfL survey, conducted by the EURL-SRM in 2024
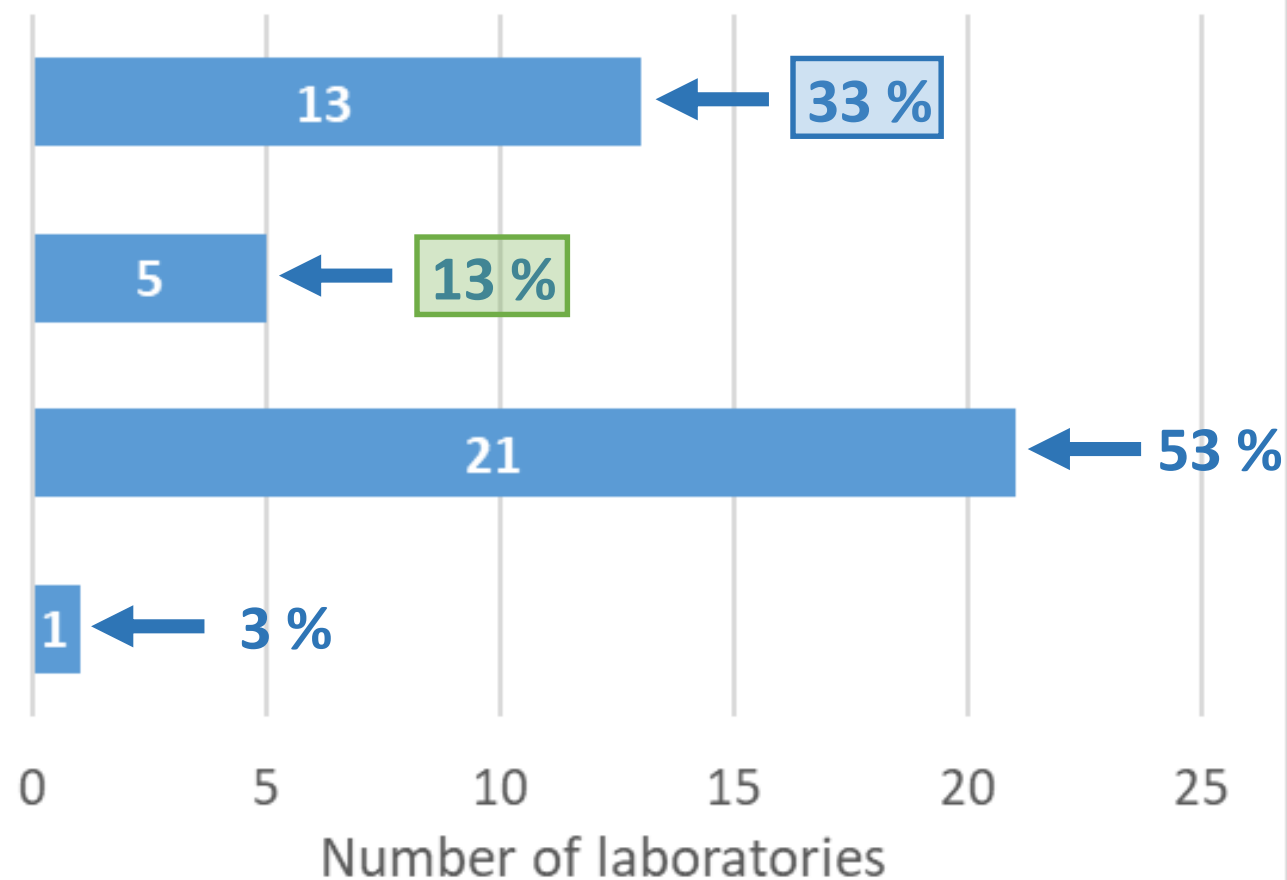
Copper Compounds| Current practice 3

Weigh sample homogenate into a Teflon vessel

2.0 g (fruit & vegetables)
0.5 g (dry and high oil content comm.)
1.0 g (Egg, milk, meat entrails)

Addition of acidic solution:

HNO$_3$ and H$_2$O$_2$

Microwave digestion

Measurement with ICP-MS
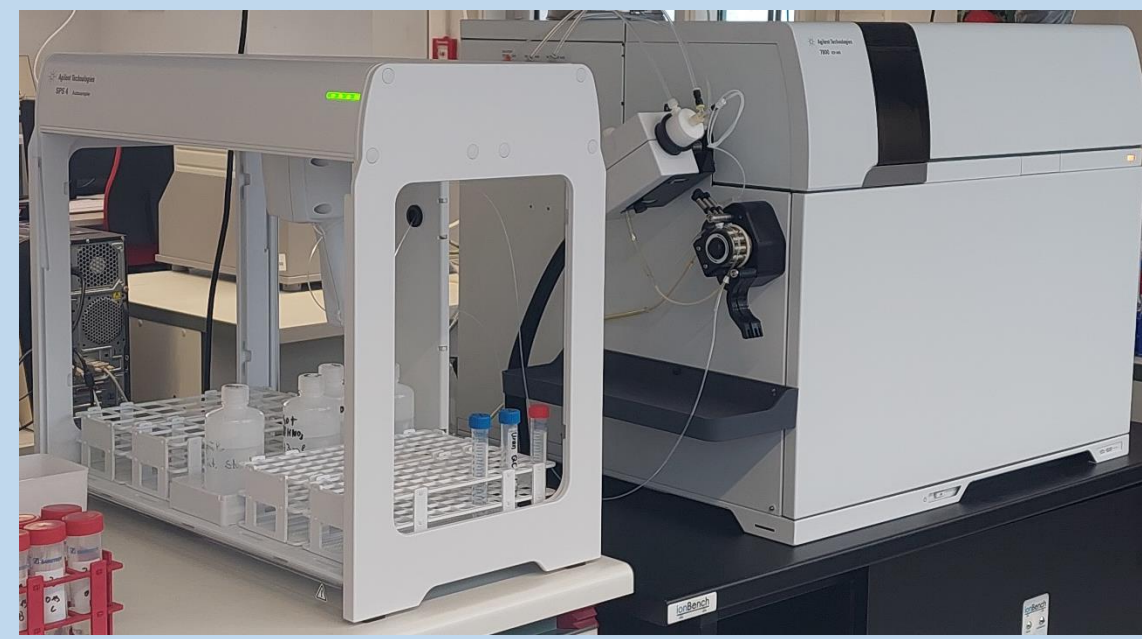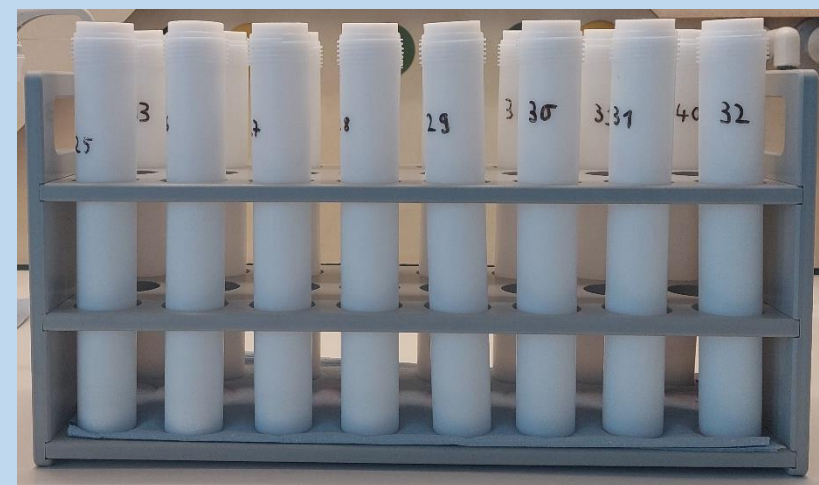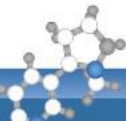
Copper Compounds| Challenges
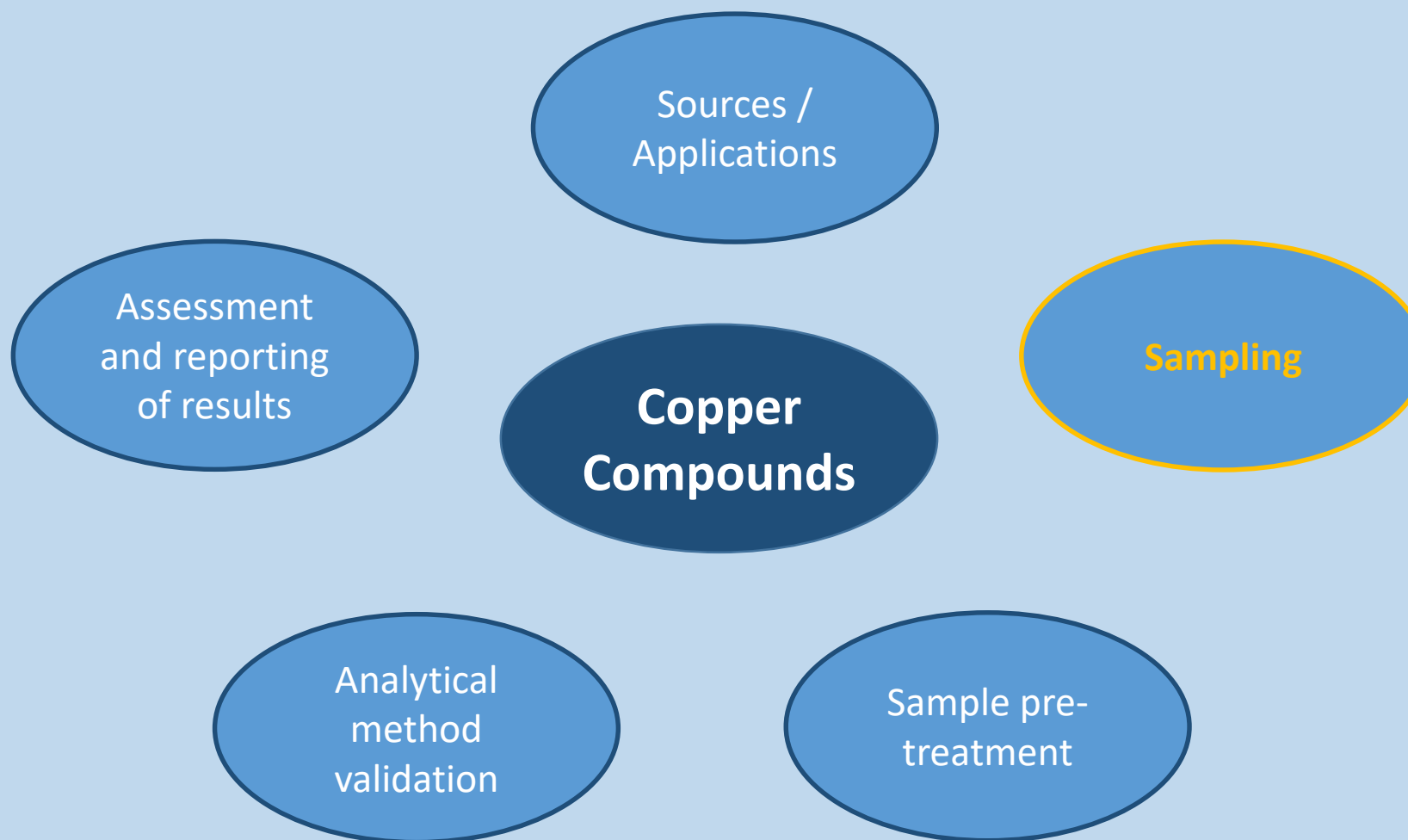
Copper Compounds| Sampling

for pesticide analysis	for contaminant analysis
Dir. 2002/63/EC:	

L 187/30   EN   Official Journal of the European Communities   16.7.2002

COMMISSION DIRECTIVE 2002/63/EC

of 11 July 2002

establishing Community methods of sampling for the official control of pesticide residues in and on products of plant and animal origin and repealing Directive 79/700/EEC

Copper Compounds| Sampling

for pesticide analysis	for contaminant analysis

Dir. 2002/63/EC:

Table 4

Plant products: description of primary samples and minimum size of laboratory samples

	Commodity classification (¹)	Examples	Nature of primary sample to be taken	Minimum size of each laboratory sample
Primary food commodities of plant origin				
1.	All fresh fruits All fresh vegetables including potatoes and sugar beets and excluding herbs			
1.1.	Small sized fresh products units generally < 25 g	Berries, peas, olives	Whole units, or packages, or units taken with a sampling device	1 kg
1.2.	Medium sized fresh products, units generally 25 to 250 g	Apples, oranges	Whole units	1 kg (at least 10 units)
1.3.	Large sized fresh products, units generally > 250 g	Cabbages, cucumbers, grapes (bunches)	Whole unit(s)	2 kg (at least 5 units)

Copper Compounds| Sampling: Example avocados in a retail store

for pesticide analysis	for contaminant analysis

Dir. 2002/63/EC:

Table 4

Plant products: description of primary samples and minimum size of laboratory samples

	Commodity classification (¹)	Examples	Nature of primary sample to be taken	Minimum size of each laboratory sample
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Copper Compounds | Sampling: Example avocados in a retail store

for pesticide analysis	for contaminant analysis

Dir. 2002/63/EC:

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Reg. (EC) No. 333/2007:

29.3.2007   EN   Official Journal of the European Union   L 88/29

COMMISSION REGULATION (EC) No 333/2007

of 28 March 2007

laying down the methods of sampling and analysis for the official control of the levels of lead, cadmium, mercury, inorganic tin, 3-MCPD and benzo(a)pyrene in foodstuffs

Copper Compounds| Sampling: Example avocados in a retail store

for pesticide analysis	for contaminant analysis

Dir. 2002/63/EC:

Table 4

Plant products: description of primary samples and minimum size of laboratory samples

	Commodity classification (¹)	Examples	Nature of primary sample to be taken	Minimum size of each laboratory sample
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Reg. (EC) No. 333/2007:

B.2.2. **Number of incremental samples**

For food, other than food supplements, dried spices or herbs, dried fungi, algae or lichen, the aggregate sample shall be at least 1 kilogram or 1 litre, except where it is not possible, e.g. when the sample consists of 1 package or unit.

For food, other than food supplements, the minimum number of incremental samples to be taken from the lot or sublot shall be in accordance with Table 3.

Table 3

Minimum number of incremental samples to be taken from the lot or sublot of food, other than food supplements

Weight or volume of lot/sublot (in kilogram or litre)	Minimum number of incremental samples to be taken
< 50	3
≥ 50 and ≤ 500	5
> 500	10

Copper Compounds| Sampling: Example avocados in a retail store

for pesticide analysis	for contaminant analysis

Dir. 2002/63/EC:

Table 4

Plant products: description of primary samples and minimum size of laboratory samples

Commodity classification (¹)	Examples	Nature of primary sample to be taken	Minimum size of each laboratory sample
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Reg. (EC) No. 333/2007:

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For food, other than food supplements, the minimum number of incre-

Minimum number of incremental samples to be taken from the lot or sublot

Weight or volume of lot/sublot (in kilogram or litre)	Minimum number of incremental samples to be taken
< 50	3
≥ 50 and ≤ 500	5
> 500	10

Copper Compounds| Sample pre-treatment

for pesticide analysis	for contaminant analysis
Dir. 2002/63/EC: Chapter 4.7 • *„[…] The part of the commodity to be analysed (1), (2), […] should be prepared as soon as practicable.* • *Where the residue level must be calculated to include parts which are not analysed, the weights of the separated parts must be recorded."*	

Copper Compounds| Sample pre-treatment

for pesticide analysis	for contaminant analysis
Dir. 2002/63/EC: Chapter 4.7 • *„[…] The part of the commodity to be analysed (1), (2), […] should be prepared as soon as practicable.* • *Where the residue level must be calculated to include parts which are not analysed, the weights of the separated parts must be recorded."* **(1), (2) → Reg. (EU) No. 396/2005 Annex I:**	

PART A

Products of plant and animal origin referred to in Article 2(1) to which MRLs apply

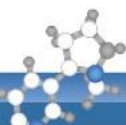| Code number	Category	Group subgroup	Main product of the group or subgroup (¹)	Part of the product to which MRLs apply
0160000		Miscellaneous fruits with		Whole product after removal of stems (except pineapples)
0163000		(c) inedible peel, large		
0163010			Avocados	

Copper Compounds | Sample pre-treatment

for pesticide analysis	for contaminant analysis

Dir. 2002/63/EC: Chapter 4.7

- *„[…] Th[...]a), (2), […] should[...]*
- *Where[...]lude parts w[...] separa[...]*

(1), (2) →

Code number	Category	subgroup	Main product of the group or subgroup (¹)	Part of the product to which MRLs apply
0160000		Miscellaneous fruits with		Whole product after removal of stems (except pineapples)
0163000		(c) inedible peel, large		
0163010			Avocados	

Copper Compounds | Sample pre-treatment

for pesticide analysis	for contaminant analysis

for pesticide analysis

Dir. 2002/63/EC: Chapter 4.7

- *„[...] Th[...] [...], (2), [...] should[...]*
- *Where[...] [...]ude parts w[...] separa[...]*

(1), (2) →

Code number	Category	subgroup	Main product of the group or subgroup (¹)	Part of the product to which MRLs apply
0160000		Miscellaneous fruits with		Whole product after removal of stems (except pineapples)
0163000		(c) inedible peel, large		
0163010			Avocados	

for contaminant analysis

Reg. (EC) No. 333/2007 → **EN 13804:2013:**

2.4 Procedures for sample preparation

- „[...] only the edible part should be investigated and the results should refer to this part"
- „Parts which are usually not intended for consumption should be removed"
- „Surface contamination like soil should be thoroghly removed by rinsing with drinking water"
- „Please note that the edible part can differ between countries"

Table 2 — Examples of sample preparation procedures for some foodstuffs

Fruit and fruiting vegetables	Remove stalks, sepals, petals, dirty and rotten parts. Rinse the sample and remove the seeds if necessary. Fruits which are not intended for eating with peel should not be rinsed but peeled and the seeds should be removed (e.g. pumpkin, melon).

Copper Compounds| Sample pre-treatment

for pesticide analysis	for contaminant analysis

Dir. 2002/63/EC: Chapter 4.7

- *„[…] Th... ...), (2), […] should...*
- *Where... ...lude parts w... ...separa...*

(1), (2) →

Code number	Category	subgroup	Main product of the group or subgroup (¹)	Part of the product to which MRLs apply
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0163010			Avocados	

Reg. (EC) No. 333/2007 → EN 13804:2013:

2.4 Procedures for sample preparation

- *„[…] o... ...nd the results...*
- *„Parts... ...ption should...*
- *„Surfa... ...hly remov...*
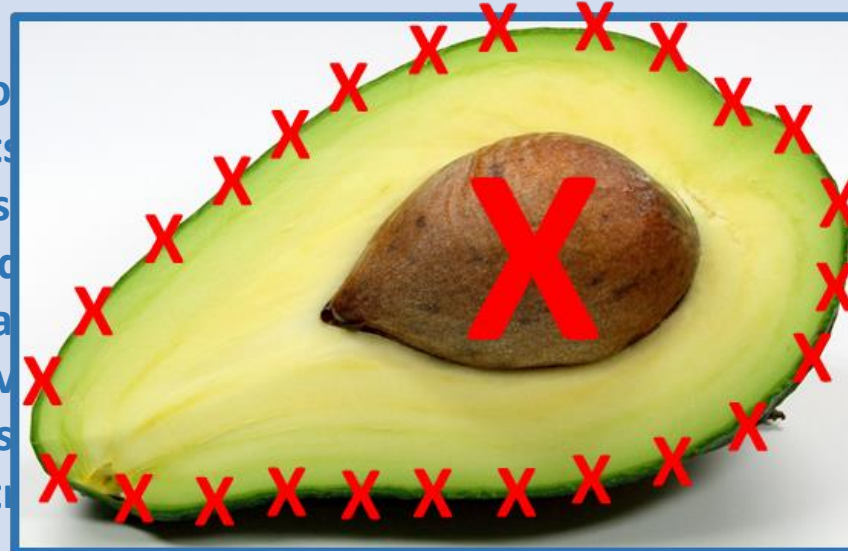- *„Pleas... ...een countr...*

Table 2 — Examples of sample preparation procedures for some foodstuffs
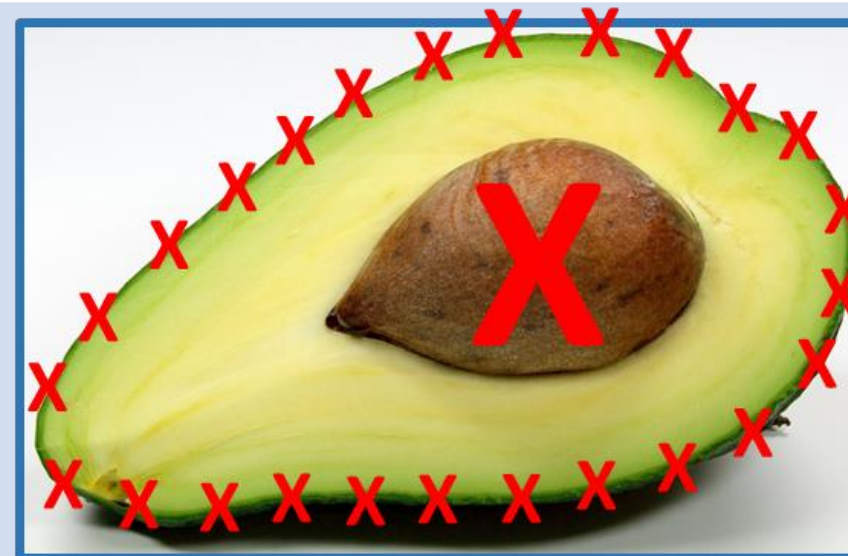
Fruit and fruiting vegetables	Remove stalks, sepals, petals, dirty and rotten parts. Rinse the sample and remove the seeds if necessary. Fruits which are not intended for eating with peel should not be rinsed but peeled and the seeds should be removed (e.g. pumpkin, melon).

Copper Compounds| Sample pre-treatment
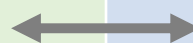
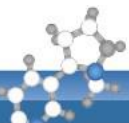| for pesticide analysis	for contaminant analysis

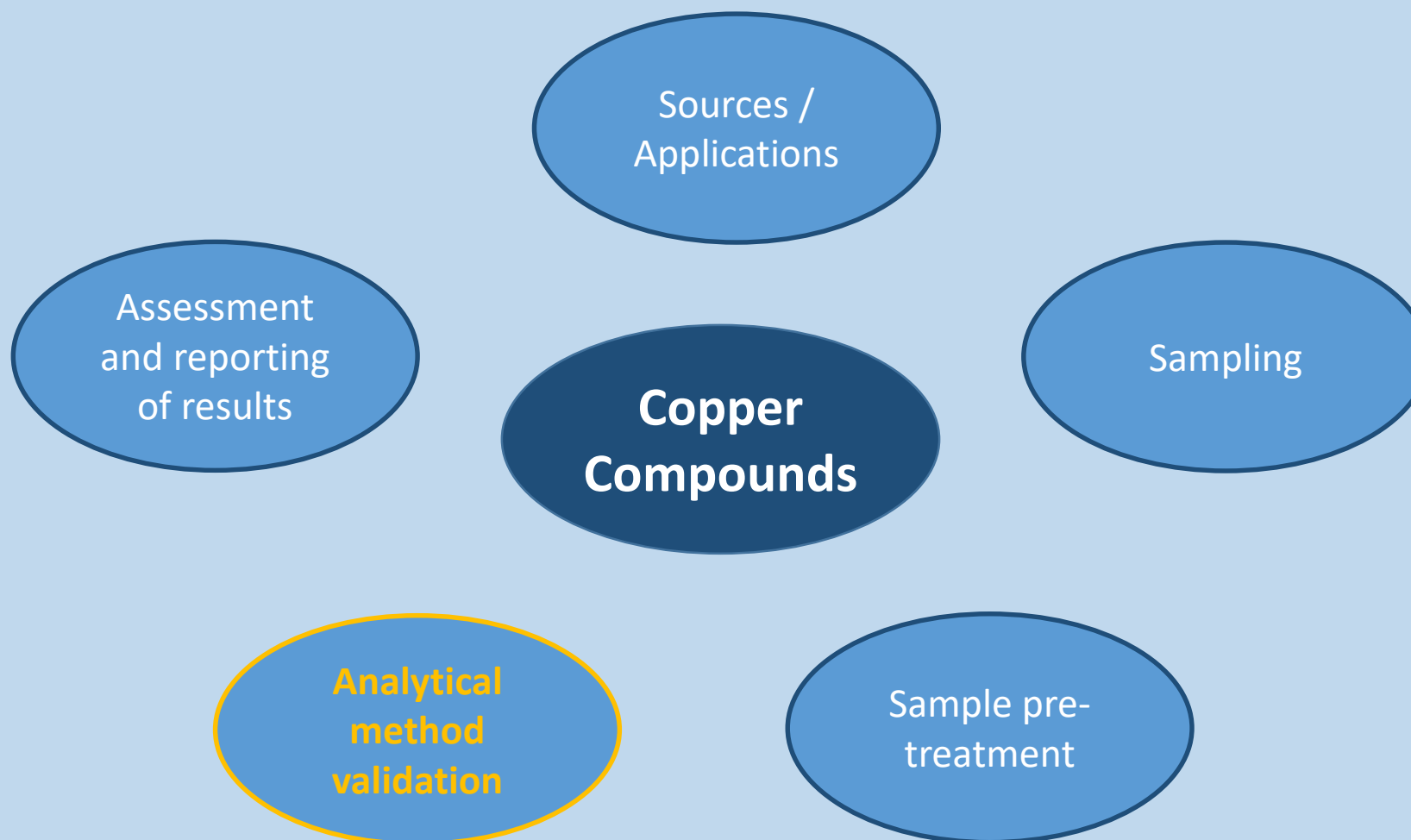**Avocados are the perfect example of the two different main goals of both approaches:**

Control of the Good Agricultural Practice ⟷ **Monitoring of the actual consumer intake**
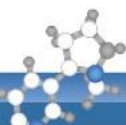
Copper Compounds| Analytical method validation

for pesticide analysis	for contaminant analysis

Document № SANTE/11312/2021v2

A typical example of the experimental set up of a validation is:
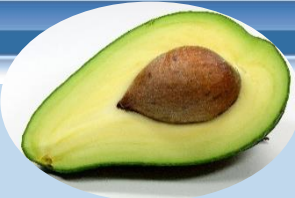
Instrumental sample sequence:

- Conditioning blanks in GC
- Calibration standards*
- Reagent blank
- Blank sample
- 5 spiked samples at target LOQ
- 5 spiked samples at 2-10 x target LOQ
- Calibration standards*

* e.g. involving bracketing calibration using 60 %- and 120 %-levels

Table 4. *Validation parameters and criteria*

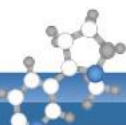| Parameter	What/how	Criterion
LOQ	Lowest spike level meeting the identification and method performance criteria for recovery and precision	≤ MRL
Specificity	Response in reagent blank and blank control samples	≤ 30 % of RL
Recovery	Average recovery for each spike level tested	70-120 %
Precision (RSD$_r$)	Repeatability RSD$_r$ for each spike level tested	≤ 20 %

Copper Compounds| Analytical method validation

for pesticide analysis

for contaminant analysis

Document № SANTE/11312/2021v2

Validation experiment results: 10 mg/kg

Mass trace	ICP-MS signal (Counts)										
	Blank	Matrix Calib. 60 %	Matrix Calib. 120 %	Rec. 1	Rec. 2	Rec. 3	Rec. 4	Rec. 5	Matrix Calib. 60 %	Matrix Calib. 120 %
Lutetium m/z 175 (ISTD)	8.23E+05	8.03E+05	7.90E+05	8.13E+05	8.23E+05	8.32E+05	8.35E+05	8.48E+05	8.26E+05	8.10E+05
Copper m/z 63	4.30E+05	9.98E+05	1.87E+06	1.57E+06	1.64E+06	1.66E+06	1.62E+06	1.62E+06	1.02E+06	1.86E+06
Recovery (%)				98.1	101.3	101.5	98.8	97.0		
Average Recovery (%)				99.3 (%)					criteria fulfilled	
Relative standard deviation (±%)				2.0					criteria fulfilled	

	for pesticide analysis	for contaminant analysis

Document № SANTE/11312/2021v2

Validation experiment results: 10 mg/kg

Mass trace	ICP-MS signal (Counts)									
	Blank	Matrix Calib. 60 %	Matrix Calib. 120 %	Rec. 1	Rec. 2	Rec. 3	Rec. 4	Rec. 5	Matrix Calib. 60 %	Matrix Calib. 120 %
Lutetium m/z 175 (ISTD)	8.23E+05	8.03E+05	7.90E+05	8.13E+05	8.23E+05	8.32E+05	8.35E+05	8.48E+05	8.26E+05	8.10E+05
Copper m/z 63	4.30E+05	9.98E+05	1.87E+06	1.57E+06	1.64E+06	1.66E+06	1.62E+06	1.62E+06	1.02E+06	1.86E+06

Recovery (%)		98.1	101.3	101.5	98.8	97.0		
Average Recovery (%)	**99.3 (%)**						criteria fulfilled	
Relative standard deviation (±%)	**2.0**						criteria fulfilled	
Signal in Blank	**26 %** (of the avg. signal in recovery samples)						criteria fulfilled	

> ➤ **natural content in avocado:** approx. 2.8 mg/kg in average (based on CVUA data from 2019, n = 5)
> ➤ **validation at lower levels virtually impossible**
> ➤ **lowest succesfully validated level** = MRL = legal **LOQ: 10 mg/kg**

Copper Compounds| Analytical method validation

| for pesticide analysis | for contaminant analysis |

for pesticide analysis

Document Nº SANTE/11312/2021v2

Validation experiment results: 10 mg/kg

Mass trace	ICP-MS signal (Counts)									
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Copper m/z 63	4.30E+05	9.98E+05	1.87E+06	1.57E+06	1.64E+06	1.66E+06	1.62E+06	1.62E+06	1.02E+06	1.86E+06
Recovery (%)				98.1	101.3	101.5	98.8	97.0		

Average Recovery (%)	99.3 (%)	criteria fulfilled
Relative standard deviation (±%)	2.0	criteria fulfilled
Signal in Blank	26 % (of the avg. signal in recovery samples)	criteria fulfilled

> **natural content in avocado:** approx. 2.8 mg/kg in average (based on CVUA data from 2019, n = 5)
> **validation at lower levels virtually impossible**
> **lowest succesfully validated level = MRL = legal LOQ: 10 mg/kg**

for contaminant analysis

EN 13804:2013 → DIN 32645:2008-11

a) direct calibration curve method:
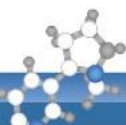– standard deviation (SD) of a **number ≥20 of blank measurements**

b) indirect calibration curve method:
– **spike** the analyte free sample at **10 equidistant concentrations** of the expected LOD up to 10x of the LOD
– alternative: **four spiking levels in triplicate**
– SD is derived from the interceptions of the calibration curves

➢ Detection limit: 3x SD
➢ Limit of quantitation: 10x SD

Copper Compounds | Analytical method validation

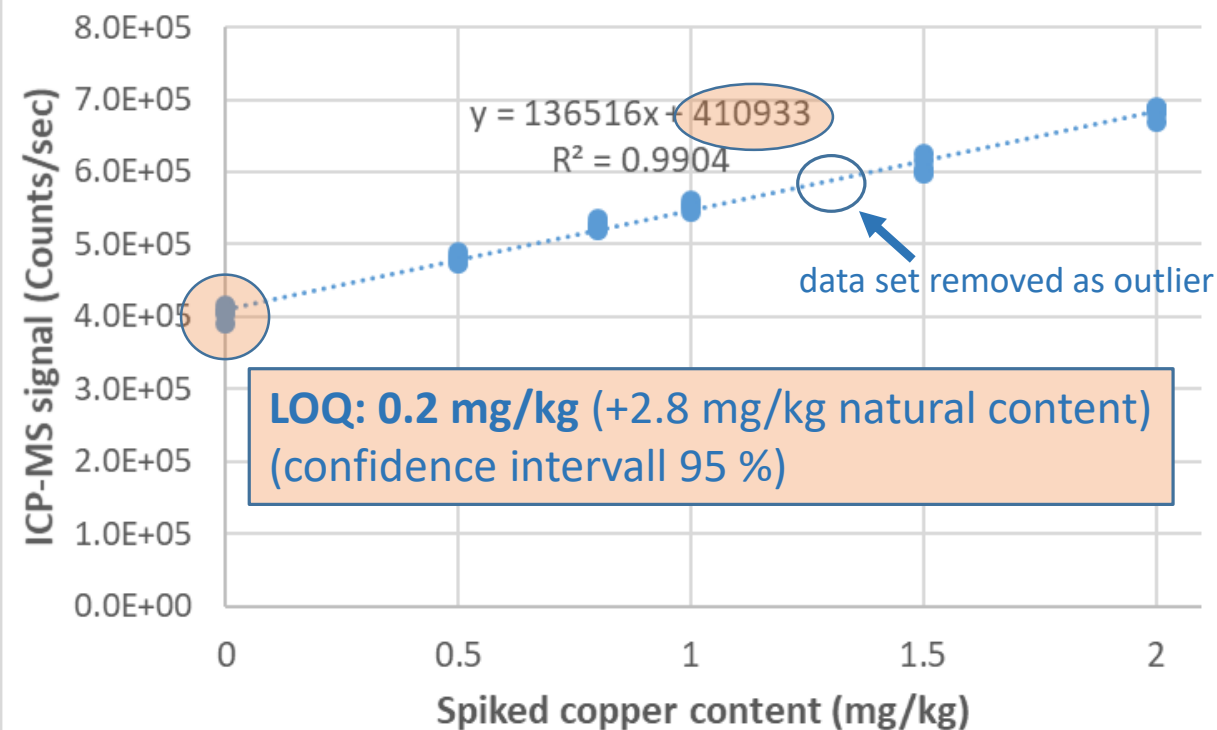| for pesticide analysis	for contaminant analysis

Document Nº SANTE/11312/2021v2

Validation experiment results: 10 mg/kg

Mass trace	ICP-MS signal (Counts)									
	Blank	Matrix Calib. 60 %	Matrix Calib. 120 %	Rec. 1	Rec. 2	Rec. 3	Rec. 4	Rec. 5	Matrix Calib. 60 %	Matrix Calib. 120 %
Lutetium m/z 175 (ISTD)	8.23E+05	8.03E+05	7.90E+05	8.13E+05	8.23E+05	8.32E+05	8.35E+05	8.48E+05	8.26E+05	8.10E+05
Copper m/z 63	4.30E+05	9.98E+05	1.87E+06	1.57E+06	1.64E+06	1.66E+06	1.62E+06	1.62E+06	1.02E+06	1.86E+06
Recovery (%)				98.1	101.3	101.5	98.8	97.0		

|		
Average Recovery (%)	99.3 (%)	criteria fulfilled
Relative standard deviation (±%)	2.0	criteria fulfilled
Signal in Blank	26 % (of the avg. signal in recovery samples)	criteria fulfilled

> ➢ **natural content in avocado:** approx. 2.8 mg/kg in average (based on CVUA data from 2019, n = 5)
> ➢ **validation at lower levels virtually impossible**
> ➢ **lowest succesfully validated level = MRL = legal LOQ: 10 mg/kg**

EN 13804:2013 → DIN 32645:2008-11

a) direct calibration curve method:
  – standard deviation (SD) of a **number ≥20 of blank measurements**

b) indirect calibration curve method:
  – **spike** the analyte free sample at **10 equidistant concentrations** of the expected LOD up to 10x of the LOD
  – alternative: **four spiking levels in triplicate**
  – SD is derived from the interceptions of the calibration curves

➢ Detection limit: 3x SD
➢ Limit of quantitation: 10x SD

Copper Compounds| Analytical method validation

for pesticide analysis

Document № SANTE/11312/2021v2

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for contaminant analysis

EN 13804:2013 → DIN 32645:2008-11

Validation experiments using 7 spiking levels, each n = 5

$$y = 136516x + 410933$$
$$R^2 = 0.9904$$

data set removed as outlier

LOQ: 0.2 mg/kg (+2.8 mg/kg natural content) (confidence intervall 95 %)

Data based on validation experiments by the elemental analysis laboratory of the CVUA Stuttgart, 06/2024

Copper Compounds| Assessment and reporting of results
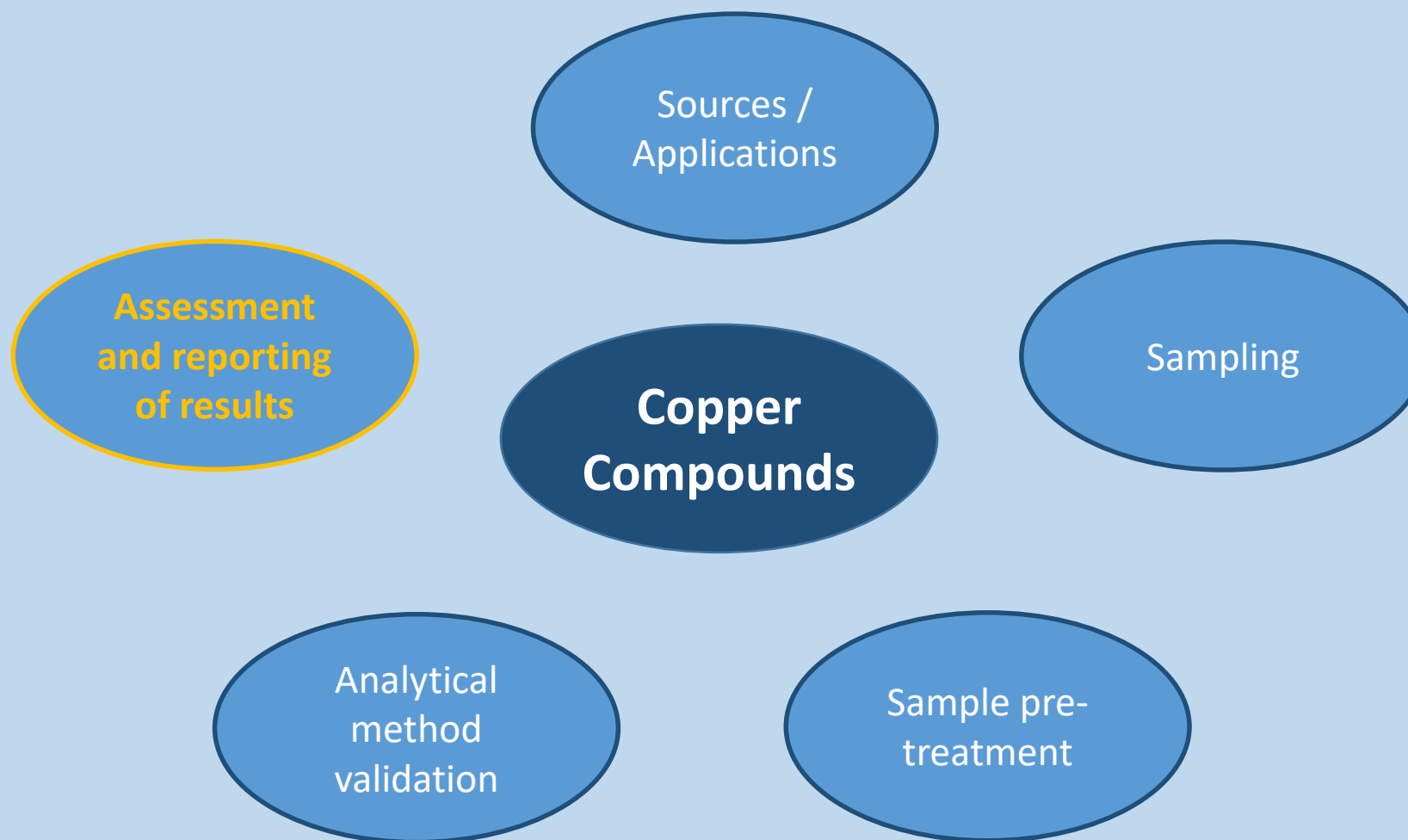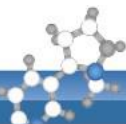
for pesticide analysis	for contaminant analysis
Document № SANTE/11312/2021v2: **Default Expanded Measurement uncertainty: ±50 %*** *with the prerequisite that the laboratory must demonstrate that its own expanded MU is less than 50 %, e.g. by the participation in PTs	

Copper Compounds| Assessment and reporting of results

for pesticide analysis	for contaminant analysis

Document № SANTE/11312/2021v2:

Default Expanded Measurement uncertainty: ±50 %*

*with the prerequisite that the laboratory must demonstrate that its own expanded MU is less than 50 % e.g. by the participation in PTs

EUPT-SRM19 in 2024: CV* [%]

Copper

Average CV*: 27.5 %

CV*: 7.7 %

Copper Compounds| Assessment and reporting of results

for pesticide analysis	for contaminant analysis

Document № SANTE/11312/2021v2:

Default Expanded Measurement uncertainty: ±50 %*

with the prerequisite that the laboratory must demonstrate that its own expanded MU is less than 50 % e.g. by the participation in ...

EUPT-SRM19 in 2024: CV* [%]

Average CV*: 27.5 %

CV*: 7.7 %

Copper

The MU for metal elements seems to be much smaller....

Should and/or can the default expanded MU of ±50 % applying for pesticides be used?
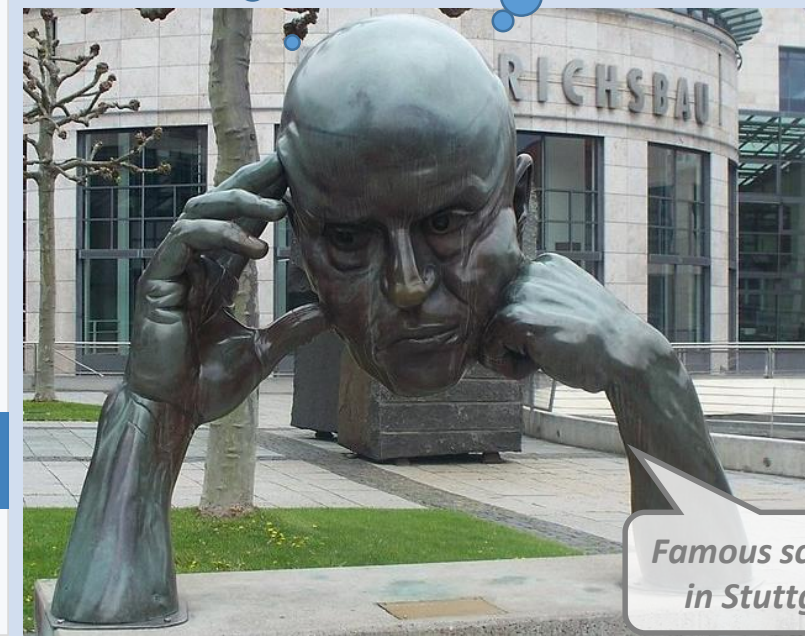
Famous sculpture in Stuttgart...

Copper Compounds| Assessment and reporting of results

for pesticide analysis	for contaminant analysis

https://food.ec.europa.eu/plants/pesticides/eu-pesticides-database_en

European Commission |

EN English   Search   **Search**

Pesticide residue(s) and maximum residue levels (mg/kg)

Code	Products to which MRLs apply	Copper compounds (Copper) ⓘ Reg. (EC) No 149/2008 applicable
0100000	FRUITS, FRESH or FROZEN; TREE NUTS	
0110000		20
0110010		20
0110020	Oranges	20
0110030	Lemons	20
0110040	Limes	20
0110050	Mandarins	20
0110990	Others (2)	20

The MRLs only apply if the provisions regarding sampling and sample pre-treatment FOR PESTICIDES were followed!

Copper Compounds | Assessment and reporting of results

for pesticide analysis	for contaminant analysis

for pesticide analysis

https://food.ec.europa.eu/plants/pesticides/eu-pesticides-database_en

European Commission | EN English | Search | Search

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for contaminant analysis

5.5.2023   EN   Official Journal of the European Union   L 119/103

~~COMMISSION REGULATION (EU) 2023/915 of 25 April 2023 on maximum levels for certain contaminants in food and repealing Regulation (EC) No 1881/2006~~

- **No maximum limits for copper in the contaminant law!**

- **toxicological assessment possible:**
  health-based guidance value of 0.07 mg/kg bw per day

efsa JOURNAL

SCIENTIFIC OPINION

ADOPTED: 16 November 2022

doi: 10.2903/j.efsa.2023.7728

Re-evaluation of the existing health-based guidance values for copper and exposure assessment from all sources

EFSA Scientific Committee,
Simon John More, Vasileios Bampidis, Diane Benford, Claude Bragard, Thorhallur Ingi Halldorsson, Antonio F Hernández-Jerez, Susanne Hougaard Bennekou, Kostas Koutsoumanis, Claude Lambré, Kyriaki Machera, Ewen Mullins, Søren Saxmose Nielsen, Josef R Schlatter, Dieter Schrenk, Dominique Turck, Maged Younes, Polly Boon, Gordon AA Ferns, Oliver Lindtner, Erik Smolders, Martin Wilks, Maria Bastaki, Agnès de Sesmaisons-Lecarré, Lucien Ferreira, Luna Greco, George E N Kass, Francesca Riolo and Jean-Charles Leblanc

Copper Compounds|Chia seeds

Data from CVUA Stuttgart 2017-22	No. of samples	Mean	Median	Min	Max
Total	18	16.1	16.0	11.5	21.8
thereof from conventional production	1	14.2	-	-	-
thereof from organic production	17	16.2	16.0	11.5	21.8

➢ **The use is rather analoguous to oilseeds (especially linseeds) but the MRL for pseudo-cereals applies**

Copper Compounds|Bovine liver

Data from CVUA Stuttgart and Freiburg 2010-22	No. of samples	Mean	Median	Min	Max	MRL
Bovine liver	113	**56**	**45**	1.4	255	
Calf liver	22	**112**	**117**	1.4	330	**30**
Chicken liver	55	3.3	3.1	1.8	4.8	
Swine liver	75	10	8.5	4.8	36	

➢ **Ruminants**, including bovines, **have genetic disadvantages** when it comes to copper retention in the liver (target organ)
  → Resorption rate of approx. 20 %
  → ACCUMULATION (EFSA 2023)

➢ **Possible sources:**
  − **! Feeding stuff: additive!**, natural content, pesticide application,…
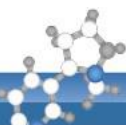 − veterinary medicine,…
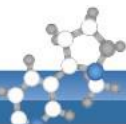
Copper Compounds|Summary

There are **DISCREPANCIES** between the field of pesticides and the field heavy metals/contaminants, regarding….

- analytical instruments used

- sampling

- sample pre-treatment

- analytical method validation and LOQ determination

- expression of results in regards to applying measurement uncertainty

- assessment of results - **do NOT mix the data of copper contents in samples – ** otherwise….

  ➢ wrong natural background assessments

  ➢ wrong intake calculations

  ➢ wrong conclusions as regards to MRL conformity

➢ **There is a need of EU-wide consolidation!**

Thank you for your attention!

Questions to:

eric.eichhorn@cvuas.bwl.de **or** eurl-srm@cvuas.bwl.de

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EURL-SRM

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