

# Residue testing as a tool for verification of organic quality

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# Objectives of organic quality management



# Objectives

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- › Maintain and justify consumer confidence
- › Ensure fair competition
- › Ensure a proper functioning of the organic market

by

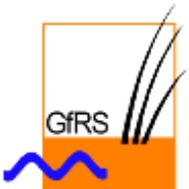
- › **Result-oriented proactive measures** based on common criteria and interpretations
- › **Use of competent staff**



# Contents of this presentation on residue testing

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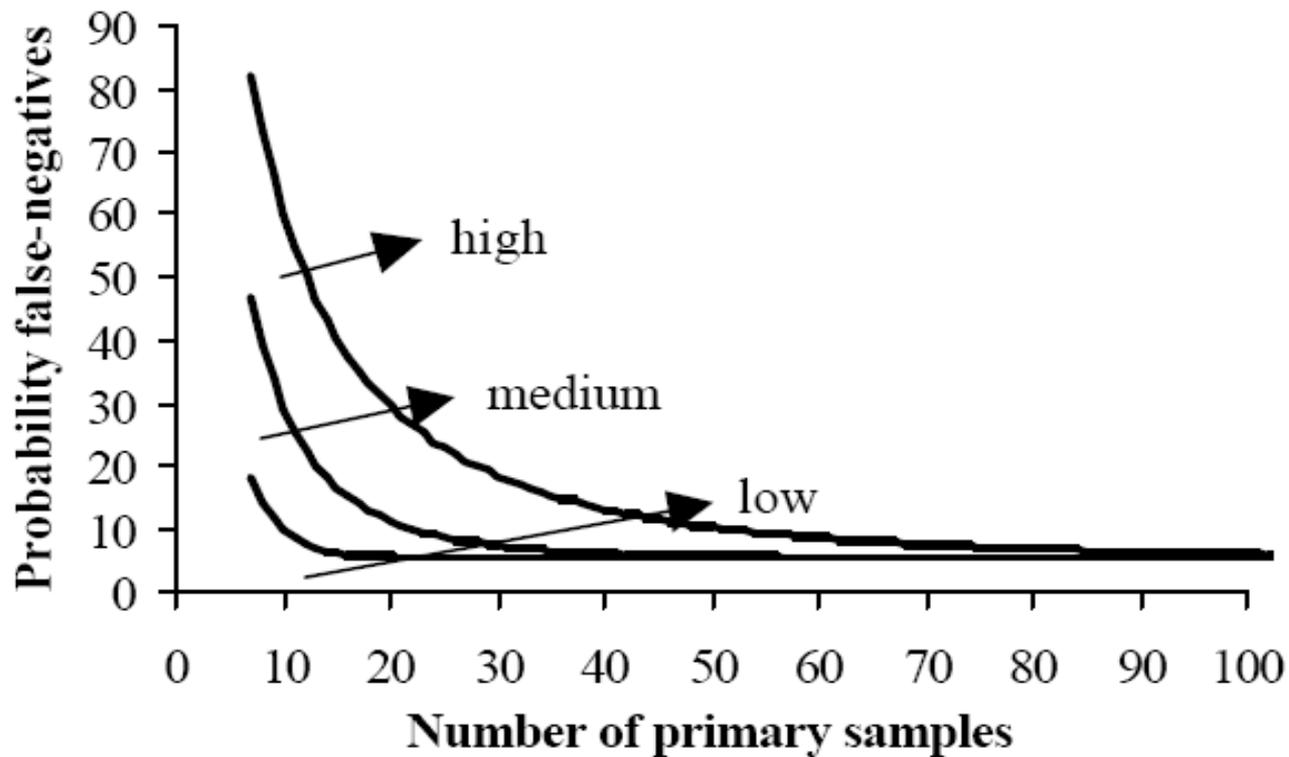
- › Sampling
- › Laboratory analysis
- › Interpretation of analysis results
- › Summary



# Sampling



# Representative Sampling?



**Figure 4. Probability false-negative bulk samples for 3 heterogeneity levels**

# How to take samples

- **Three samples:** in Debasafe-bags if possible one for the laboratory, one for the operator, and – if applicable - one for the Control Body
- **Sampling quantity:** different, depends on the needs of the laboratory. Basic principle: try to sample possible as much active ingredients as possible
- **Avoid contamination** when taking samples: use one way gloves, no use of perfume, repellents, ...
- **Fill in all fields** on the Debasafe bag and write a **sampling protocol**



# Sampling Protocol

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- › Required for interpretation of analysis results
- › Describes framework conditions for sampling (when, where, how, includes photos and copies of relevant documents)
- › Required for correct interpretation of analysis results
- › Must be as complete as possible



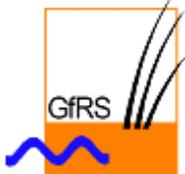
# Laboratory Analysis



- The laboratory needs a valid accreditation for the chosen scopes
- Pesticide Screening Multi-Method (e.g. QuEChERS = Quick-Easy-Cheap-Effective-Rugged-Safe): tests for more than 500 active pesticide ingredients
- Additional methods: e.g. Chlormequat, Mepiquat  
Imported residues from straw (Glyphosat, Chlormequat, Mepiquat)

## Analysis

- Pesticides
- Feed – composition
- GMOs
- Ingredients and processing aids
- Isotopes for the origin or nitrogen



## Analysis options:

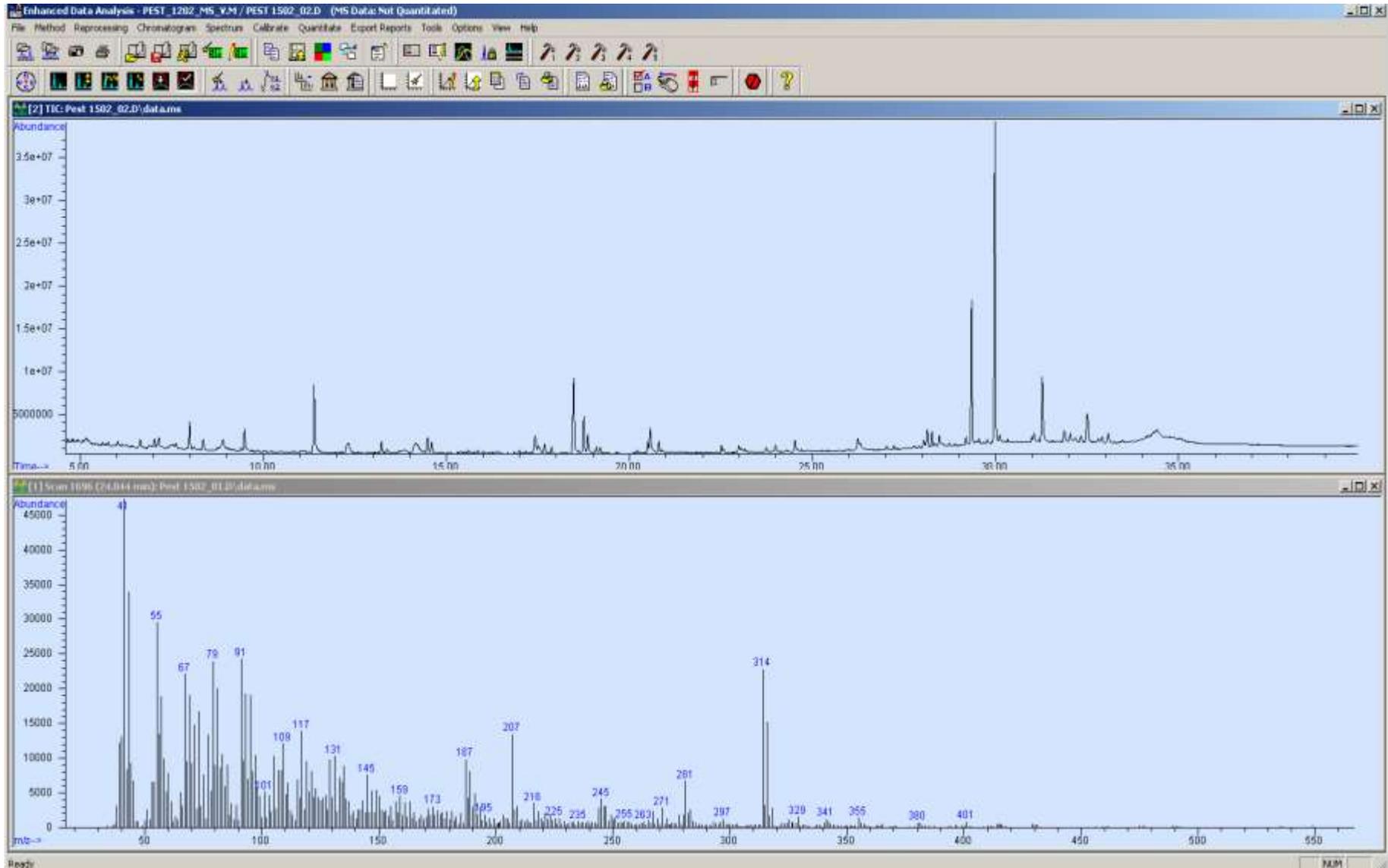
- › Pesticides
- › GMO
- › Isotopes (determination of origin, use of prohibited nitrogen fertilizer in „organic“ inputs for organic farms („fertilizergate“ in the US)

## Quality requirements

- The laboratory needs a valid accreditation according to ISO 17025 for the chosen matrices and analysis
- Laboratory should participate in (organic) proficiency tests
- Laboratory should have organic expertise and also offer advice on restrictions and limitations of the analysis result.
- Analysis method chosen must be suitable for its purpose.



# GC/MS: Restrictions and limitations of the analysis results



# Methodology differences: Phosphine residues

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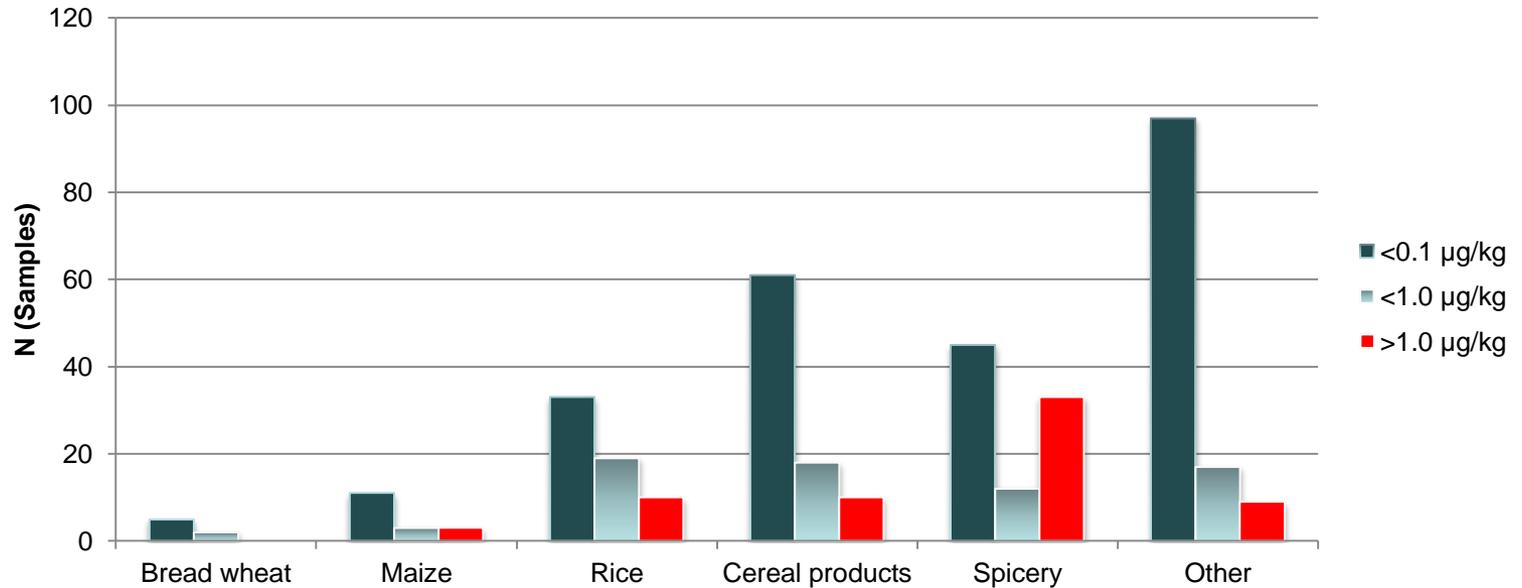
## Methods of analysis

- Dräger<sup>®</sup> gas detection tubes: Limit of detection (LOD) 10 µg/kg
- headspace GC – FPD: LOD 0.1 µg/kg

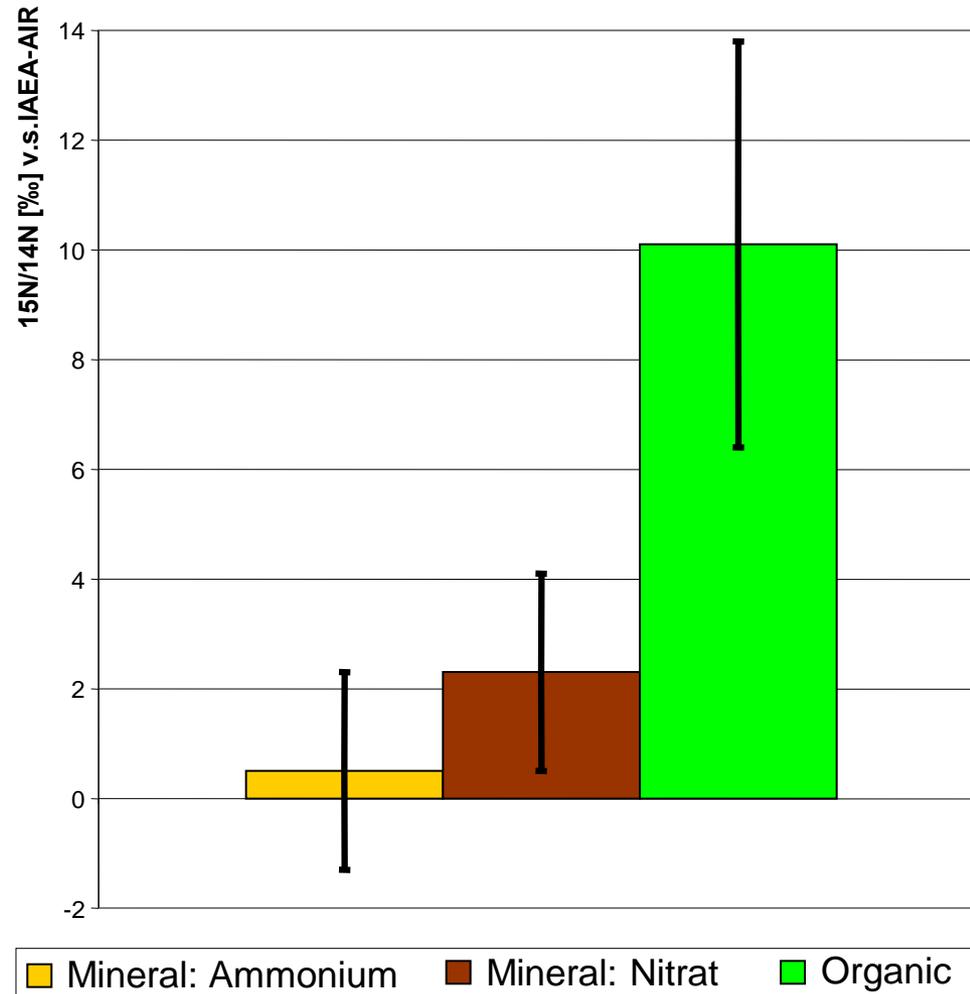
# Residues

## PH<sub>3</sub> concentrations in official organic samples Labor Urkantone 2000-2010

| c(PH <sub>3</sub> ) in [µg/kg] | Bread wheat | Maize | Rice | Cereal products | Spicery | Other | total |
|--------------------------------|-------------|-------|------|-----------------|---------|-------|-------|
| <0.1 µg/kg                     | 5           | 11    | 33   | 61              | 45      | 97    | 252   |
| <1.0 µg/kg                     | 2           | 3     | 19   | 18              | 12      | 17    | 69    |
| <10.0 µg/kg                    | 0           | 3     | 10   | 10              | 33      | 9     | 65    |



# Differentiation of conventional and organic fertilizer



Shearer G.B.; Kohl D.H.; Commoner B. (1974). *Soil Science*. 118, 308-314.

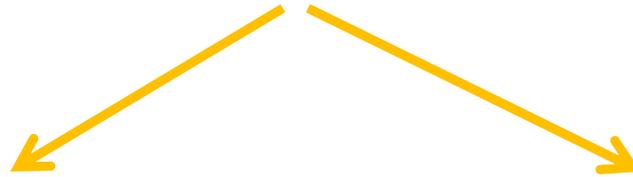


# Interpretation of analysis results



# Interpretation of analysis results

- Measurement uncertainty must be taken into account
- (Preliminar) decision must be taken how to proceed:



**No suspicion of non-allowed substances**

No more action

**Suspicion of the use of non-allowed substances**

Further actions necessary



## Objective:

Improving the information situation for residue findings in organic production by control bodies through anonymous collection of cases and corresponding interpretations

Gefördert durch:



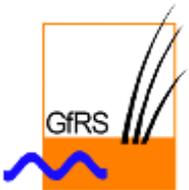
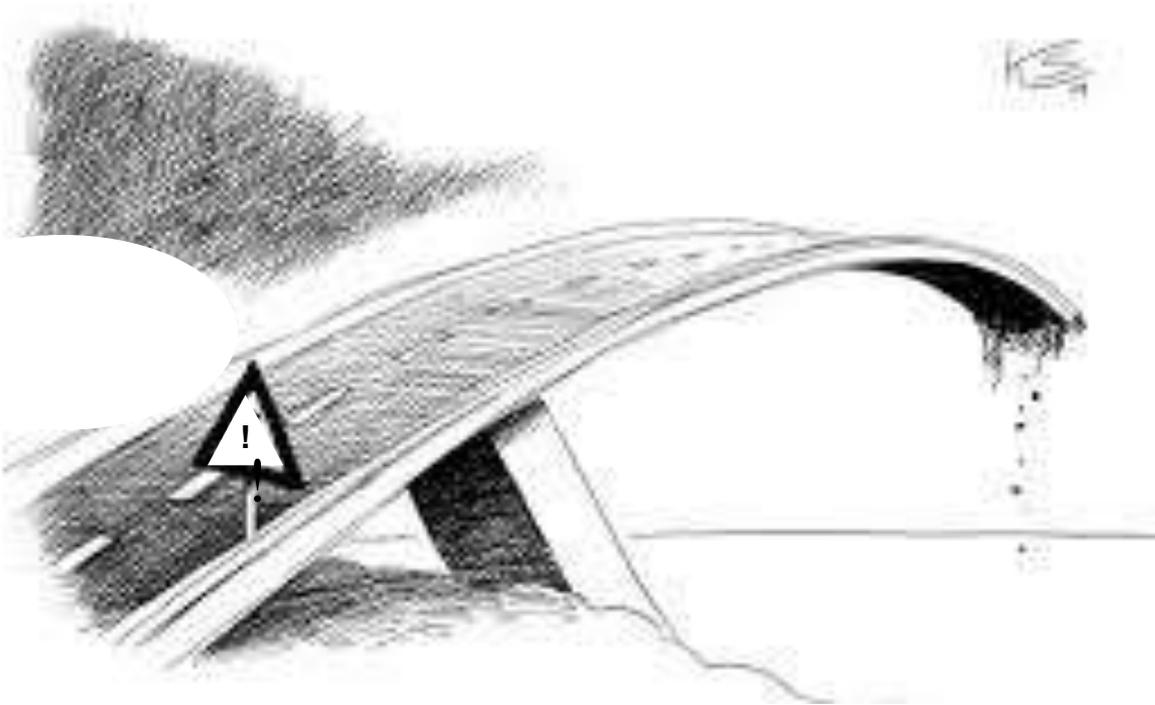
aufgrund eines Beschlusses  
des Deutschen Bundestages



# Is the non-detection of pesticides sufficient to proof organic production?



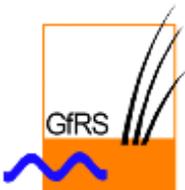
# Summary



# Summary

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- › In organic production, sampling and analysis is used to detect the use of prohibited inputs – this requires targeted, risk-oriented sampling
- › Due to inhomogeneous distribution of substances in (bulk) products, possible unsuitable analysis methods and possible lab-errors, there is always a risk of diverging analysis results
- › Residue freeness does not mean that a product is organic – traceability is also determinant
- › Sampling and analysis is only one instrument of the inspection toolbox, besides on-site reviews and document checks



**Thank you very much!**

