Compilation of CS_2 Background Levels in Organic Crops to help Establishing Reasonable MRLs for Dithiocarbamates

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Introduction

For controlling compliance with EU-MRLs, residues of dithiocarbamates (DTCs) are analyzed by using common-moiety methods involving the release of carbon disulfide (CS_2) via an acid digestion/hydrolysis step. Besides being laborious and costly, the specificity of this common-moiety approach to the presence of DTC residues is compromised in case of commodities naturally containing compounds that also release CS_2 both spontaneously as well as during DTC analysis, e.g. in crops belonging to the *Brassicaceae* and *Alliaceae* family (see *Fig. 1*). As these naturally-occurring CS_2 contents cannot be distinguished from the CS_2 generated from residues of DTC pesticides, there is a strong interest to determine the range of CS_2-levels released during analysis. This knowledge will help in setting MRLs and evaluating CS_2-levels more reasonably.

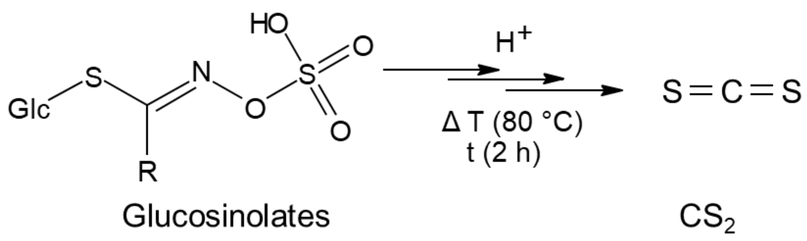

Fig. 1: Formation of CS_2 from natural compounds e.g. glucosinolates using common-moiety DTC approach. Mustard oils (= isothiocyanates, R-NCS) formed as intermediates through enzymatic deglucosilation (e.g. during sample preparation) are important intermediates.

Approach

In order to compile typical ranges of phytogenic CS_2 background levels in various organic foodstuffs, official EU- and private laboratories were invited to analyze organically produced samples by the common-moiety DTC approach to get an EU-wide overview of CS_2 background levels and to be able to perform an exhaustive statistical evaluation of these CS_2 levels.

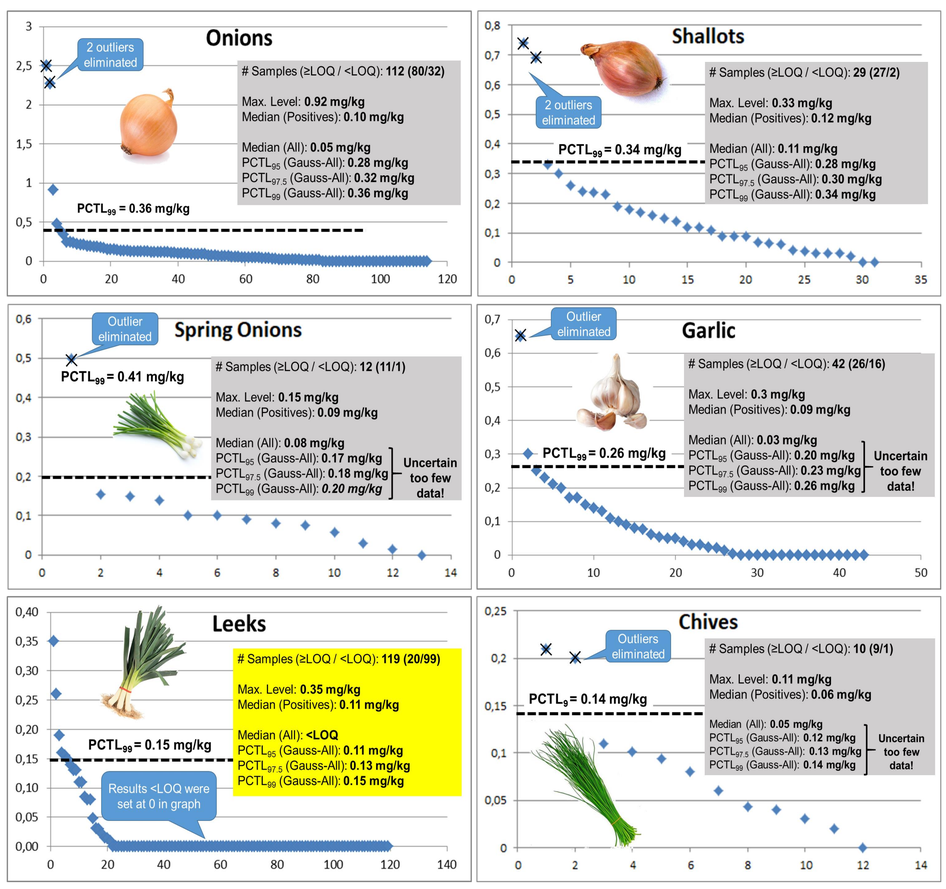

Fig. 2: CS_2 background levels (mg/kg) in various commodities of the Alliaceae family

Results

Around 11.600 CS_2 datasets concerning 114 individual products have been collected. A total of 49 different suppliers including EFSA have provided data. To fill some gaps and to further investigate relevant commodities the EURL-SRM analyzed 304 additional samples. For some commodities the number of data was sufficiently high (min. 59 samples) to allow a statistical evaluation of "phytogenic" CS_2 (see *Fig. 2* and *3*).

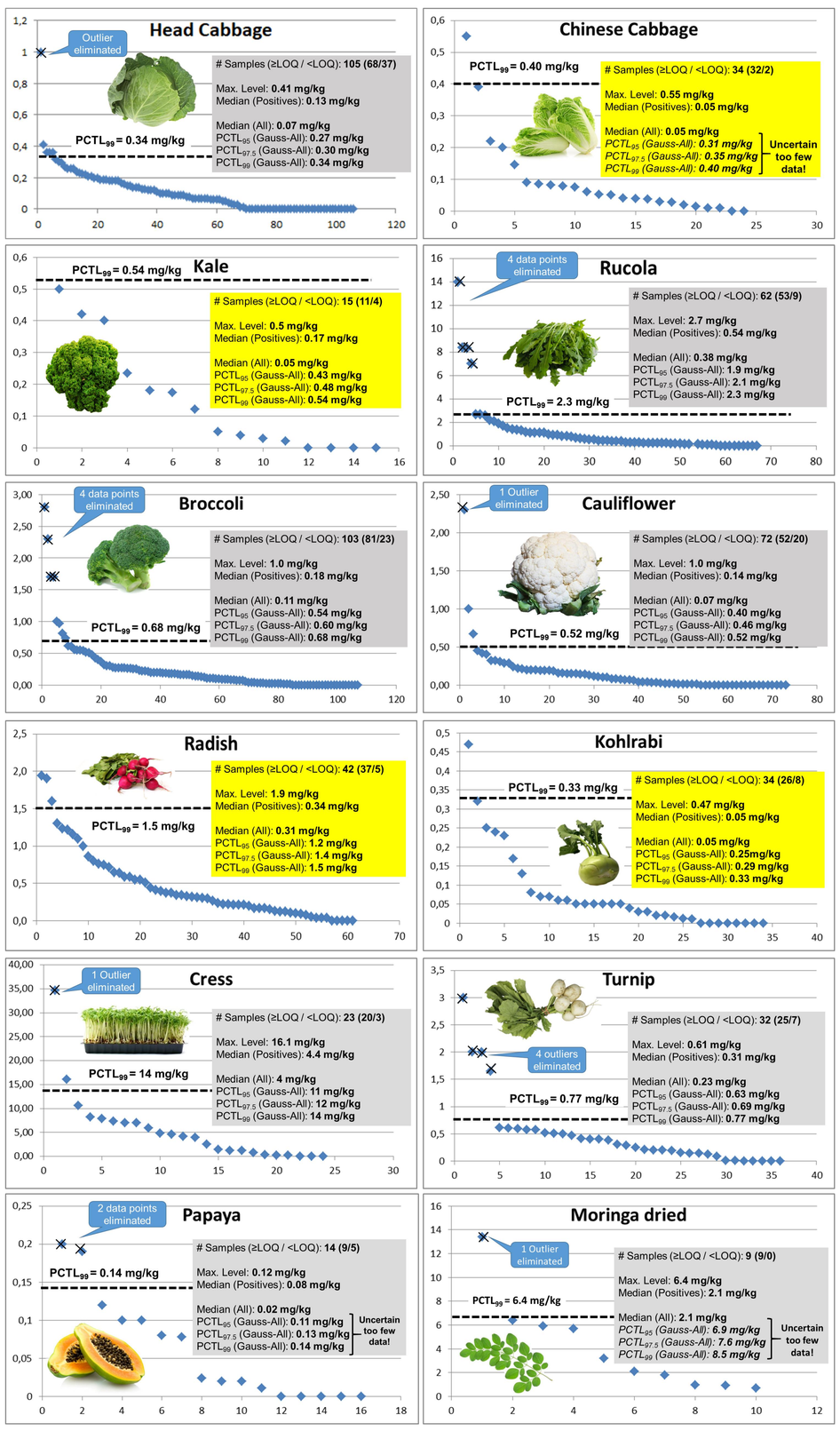

Fig. 3: CS_2 background levels (mg/kg) in various commodities of the Brassicales plant order

Especially with brassica crops sample homogenization strongly affects background CS_2 levels. Ambient milling leads to higher CS_2 compared to cryogenic due to increased formation of mustard oils. The data is mixed as ambient milling is still common.

Summary

Excluding some outliers, commodity-specific limits that consider background CS_2 levels should be possible to set for some crops, e.g. onions, leek, head cabbage, rucola, broccoli, cauliflower and radish. For other commodities further datasets are required for sound statistics. In commodities with high levels of background CS_2 the ability of setting reasonable CS_2-MRLs with which GAP-conformity can be effectively controlled is compromised. The data were provided to EFSA for a final assessment.

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