

Chlorate and Perchlorate Residues in Food of Plant Origin

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Chlorate

Introduction

Chlorates are strong oxidants with herbicidal and biocidal activity. Since 2008, chlorate is no longer authorized for use as a pesticide in the EU. Also, sodium chlorate may no longer be used in biocide products. Still, more than 10 % of the food samples tested showed chlorate residues higher than 0.01 mg/kg.

Throughout the food production process there is a multitude of different paths with which food can be contaminated with chlorate. One of the main contributors is surely the use of chlorinated water e.g. for irrigation in the field, for the washing of crops, for the disinfection of surfaces in food production premises or for the production/processing of food (e.g. juice from concentrate).

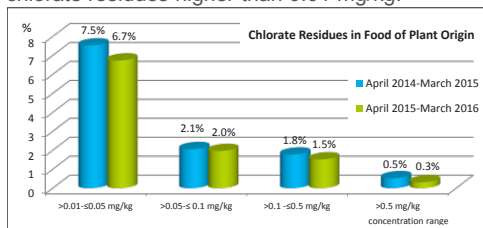
Legal aspects

In accordance with Reg. 396/2005/EU, the current standard MRL for chlorate is 0.01 mg/kg. Nevertheless, the EU Commission and the EU member states have agreed to refrain from taking enforcement actions unless health concerns were identified.

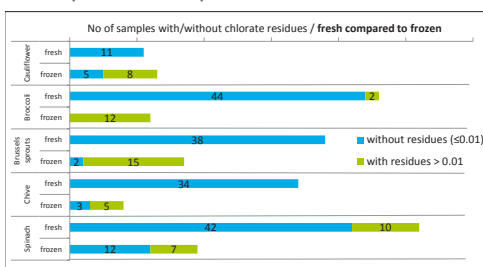
Results

CVUA Stuttgart has been routinely monitoring residues of chlorate in food of plant origin since 2013. During the last two years over 4,300 samples were routinely tested for the presence of chlorate residues with no significant changes in the frequency of findings.

In 4/2014 – 3/2015 and 4/2015 – 3/2016 11.9 % and 10.5 %, of the samples respectively showed chlorate residues higher than 0.01 mg/kg.



The highest levels were found in leafy and fruiting vegetables. The percentage of samples with chlorate residues higher than 0.01 mg/kg among frozen vegetables was significantly higher than in the respective fresh products.

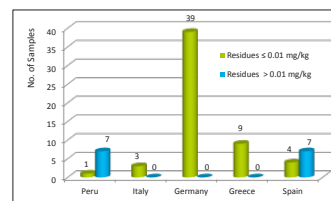


Summary

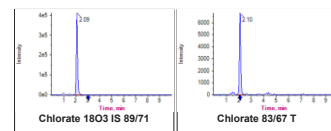
10.5 % of the samples tested between April 2015 and March 2016 showed chlorate residues higher than 0.01 mg/kg. None of these samples exceeded the ARfD of 0.036 mg/kg bw (EFSA, 2015) calculated with the EFSA PRIMo model using the variability factor of 1.

Commodity	Origin	Chlorate mg/kg
Chive frozen	unknown	3.8
Coriander leaf	Thailand	1.7
Aubergine	Netherlands	1.2
Chili pepper	Uganda	0.96
Asparagus green	Peru	0.91
Head lettuce	Germany	0.72

Highest Residues April 2015 – March 2016



Chlorate Residues in Asparagus of Different Origin



Chlorate in currant (0.01 mg/kg)

Perchlorate

Introduction

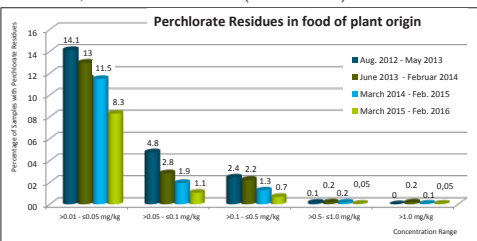
The presence of the contaminant perchlorate in foods of plant origin is mainly due to the use of fertilizers.

Legal aspects

The competent authorities of the Member States agreed not to take action below the reference levels agreed on March/June 2015.

Categories	Perchlorate Reference Values (SC PAFF 2016) mg/kg	Samples with High Residues (March 2015 - Feb. 2016) mg/kg
Fruit and vegetables, with exception of:	0.1	Green Beans 0.12
Pumpkin family and leafy vegetables, with exception of:	0.2	Cucumber 0.48* Melone 0.41*
Celery and spinach from greenhouse/ under plastic	0.5	Spinach 0.47
Herbs, nootla, head lettuce, lettuce from greenhouse/under plastic	1.0	Rosemary 4.8* Dill 0.3; Parsley 0.26 Anzula 0.2; Head Lettuce 0.18

The data showed a slight but steady decrease of positive findings over the last years. Nevertheless, there were still samples showing perchlorate levels significantly exceeding the reference values agreed upon the Standing Committee on Plants, Animals, Food and Feed (SC PAFF).

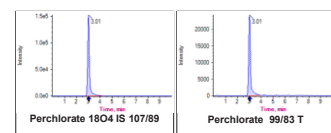


Summary

Between March 2015 and February 2016 only three out of nearly 2100 samples showed residues above the reference levels. Following the ALARA principle these reference levels should be reconsidered in the future.

Analytical method

Chlorate and perchlorate residues can be simultaneously measured using the QuPPE method 1.4 "PerChloPhos" and the Hypercarb column. When using new Hypercarb columns or pre-columns, poor peak shapes and strong retention can be prevented by conditioning the column with e.g. 30-50 injections of QuPPE-extracts of spinach.



Perchlorate in currant (0.01 mg/kg)

Results

CVUA Stuttgart has been routinely monitoring residues of perchlorate in food of plant origin for the past four years.

