

BioFach 2018

lach : bruns

Taking a closer look.

Pesticides and contaminants in organic products

Dr. Günter Lach, 15. February 2018

**Undesirable substances →
Pesticide Residues or Contaminants?**

Surface treatment substances: DPA and OPP

Chlorate / Perchlorate / Anthraquinone

DPA AND OPP

DPA = DIPHENYLAMINE

OPP = 2-(ORTHO)-PHENYLPHENOLE

Multiple use as

- postharvest chemical (fungicide) on citrus
- antioxidant f. ex. in lubricants approved for use in machines with food contact
- antioxidant in rubber and foam materials

Multiple use as

- postharvest chemical (fungicide) on citrus
- preservative in food (E231)
- biocide/disinfectant in households, hospitals, food processing plants etc.
- fungicide in food packaging

DPA AND OPP

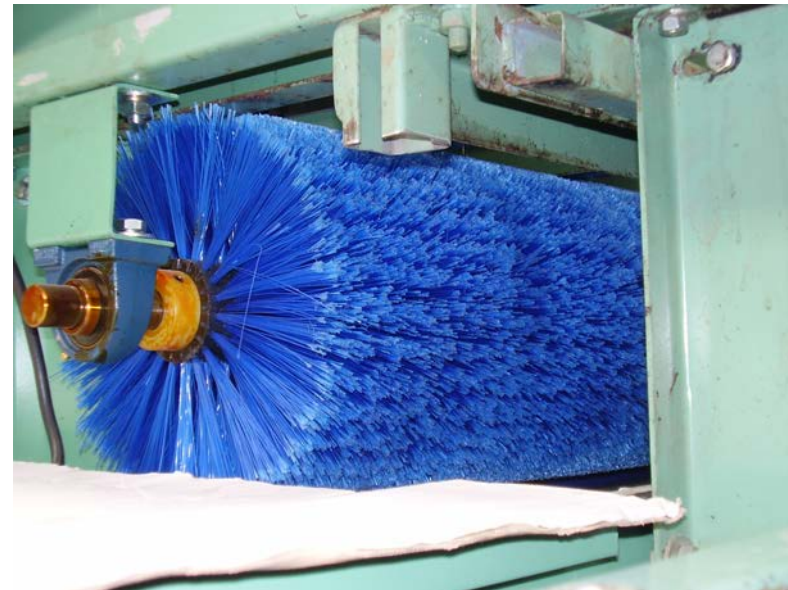
Possible sources of Contamination

Brushes like these....



...or...

... like these?



DPA AND OPP

Possible sources of Contamination

Cross-Contamination at packing stations

(by Janina Wojzich, DFHV 2013)



Cross-Contamination of untreated lemons after transport via rolls, where treated citrus products have been processed in advance. Levels of the surfactant chemicals were above 0,01 mg/kg!



DPA AND OPP

Regulatory situation:

	Conventional food	Organic food
Classification	Pesticide?!	Contaminant?
Legal basis	MRLs acc. to reg. (EC) no. 396/2005	Orientation value BNN: to be applied?
MRL resp. orientation value	DPA: 0,1 mg/kg on apples and pears as <u>temporary MRL</u> , taking into consideration concerns about cross- contamination effects	0,01 mg/kg

CHLORATE

Use as a *herbicide*



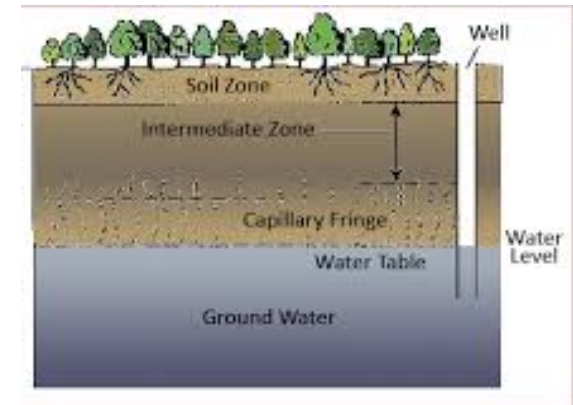
- *2008: no re-approval in the EU as a pesticide*
- *Consequence : MRL acc. to reg. (EC) 396/2005*

0,01 mg/kg

CHLORATE AND PERCHLORATE

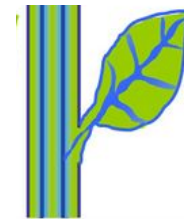
❖ *Natural sources of Chlorate and Perchlorate:*

- *Mineral deposits (geological) and therefore in mineral fertilizers, too*
- *soil*
- *groundwater*



❖ *Easy assimilation by plants*

- *Systemic intake*
- *Enrichment within the growing parts (vegetative)*



CHLORATE



Anthropogenic sources of Chlorate

- Disinfection activities „Chlorine bleaching“, „Hypochlorite“
- „**EU-Biocide regulation**“ no. 528/2012 resp. Reg. (EU) no. 2017/1273
Na- / Ca-Hypochlorite listed as biocidal actives to be used in the
“food and feed sector” and drinking water (product groups 4 and 5)
- „Chemistry“ depending on the influence of light, temperature, time :
Hypochlorite → Chlorate
Hypochlorite → Perchlorate (Oxidation processes)
- Chemical by-products during „alteration“: **Chlorate / Perchlorate**

CHLORATE

- Using **drinking water**, which is legally treated with chlorine containing disinfectants



- **Hydro-Cooling**



- **Process water**



CHLORATE AND PERCHLORATE

Update of the current regulatory situation (January 2018):

	Chlorate	Perchlorate
Classification	<u>Still</u> as a pesticide	Contaminant
Legal basis	Reg. (EC) No. 396/2005 (Pesticide-MRLs)	Reg. (EC) No. 315/1993 as basis → temporary reference levels
MRL / legal limits / action limits	0,01 mg/kg (Default value) Temporary action limits: <u>still in place</u> vegetables: 0,25 mg/kg carrots: 0,2 mg/kg other food: 0,1 mg/kg	0,02 up to 1,0 mg/kg, depending on the food product



CHLORATE AND PERCHLORATE

Actual planning of regulatory activities

- **Chlorate** (DG Sanco)
 - actions on pesticide MRLs based on monitoring data and on a working document published in 2015 with draft MRLs for all commodities listed in Annex I of reg. (EC) no. 396/2005
 - actions on baby food: specific regulations planned
 - actions on drinking water: decrease WHO-guideline level of 0,7 mg/l (DG Environment)

CHLORATE AND PERCHLORATE

Actual planning of regulatory activities

➤ **Perchlorate**

New “regulatory levels” based on recent monitoring data are planned (displacing the “intra-union trade levels”)

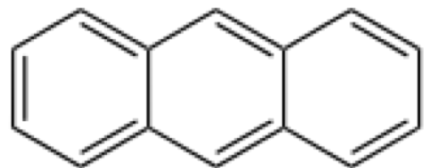
Commodity	Current level (mg/kg)	Draft level (mg/kg)
Fruits and vegetables, except	0,1	0,05
- Cucurbitaceae, kale, leafy veg., except	0,2	0,1
- spinach, rucola, beet leaves, herbs (glassh.)	0,5 – 1,0	0,5
Tea (Camellia sinensis), dried	0,75	0,75
Herbal and fruit infusions, dried	0,75	0,75
Foods for infants, young childr. – ready to eat	0,02	0,01
Other food	0,05	0,02

ANTHRAQUINONE

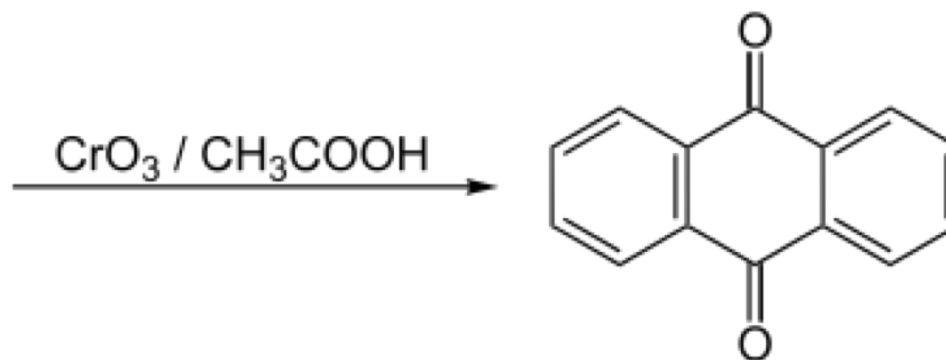


MOAH = mineral oil “aromatic” hydrocarbons

➤ „PolyAromatic Hydrocarbons“



Anthracene



Anthraquinone

ANTHRAQUINONE

TEA



Possible sources of contamination:

- **Packaging** (in the meantime less important)
- **Environmental contamination** (by poisoned air)
- **Contamination during processing** (drying, roasting)

ANTHRAQUINONE

TEA Contamination during processing (drying, roasting)



ANTHRAQUINONE

- Fossil burning and roasting processes bear a high risk related to contamination with Anthraquinone.

- ***Solution:***

Lower process temperature and find good balance between food quality and process contaminants:

➡ significant decrease of Anthraquinone , and

➡ significant decrease of Phthalimide

Possible contamination pathways

Drift by pesticide applications
on neighbouring fields

Long distance drift
and environmental impact

Use of approved
fertilizers and
other materials

Contamination
by past uses of
pesticides



Mixing with
conventional
products
(unintended or
deliberate)

Cross-contamination during

- processing
- storage
- packaging

Illegal use

OVERALL CONCLUSION

- *Increasing processing of food* and the
- *Increasing impact by a “chemical” world*
(chemical pesticides, biocides and disinfectants, plasticisers, mineral oil based products and fossil burning, ingredients of agriculture working material)

bear the risk for more and more discussion about the *integrity of organic products*.

- *Competent analytical laboratories* providing reliable analytical data and reasonable interpretations of the findings are an *important prerequisite* to face these challenges.

BioFach 2019

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Taking a closer look.

***... Pesticides and
Contaminants ...***

... a never ending story ...