



## Common Forum – Working Document

### Concentrations of contaminants in vegetables

Common Forum/DD 2013.009

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Synthesis of the answers received after Ana Alzola's request (30/01/2013)

Updated the 12 April 2013

#### **The request:**

These days I have been working with the results of an investigation we have carried out in an area where vegetables could be affected by contamination from soil and deposition.

I expected high concentrations of contaminants in the samples and the results confirm my suspicion but our Agency for Food Security thinks the concentrations are too high.

I wonder if Common forum members could send me references of similar studies (in any language) to compare these concentrations. It would be very helpful and interesting (I really like this topic).

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#### **ANSWERS FROM CINUTRIES**

##### **Austria / Dietmar Müller (30.01.2013)**

To look for studies regarding contaminant uptake by plants it would be helpful to know a specification which contaminants (at least group of contaminants) are under investigation/assessment.

##### **Finland / Jussi Reinikainen (01.02.2013)**

No relevant information to Ana's demand.

##### **Germany / Andreas Bieber (30.01.2013)**

I hope that our Environmental Agency (i.e. Joerg) can provide such studies or information.

##### **Lithuania / Kestutis Kadunas (30.01.2013)**

No experience in this field.

##### **Netherlands / Co Molenaar (30.01.2013) – Frank Swartjes (19.02.2013)**

Risks from vegetable consumption depend on:

- contaminants + concentrations + depth distribution
- soil characteristics
- (last but not least) type of vegetables (actual crops or politically defined crops)

We have models for calculating risks for Cd, Pb en Zn, combining plant uptake models and consumption-weighted vegetable consumption pattern. The latter is related to Dutch conditions, but can be use from a wider perspective.



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For organic contaminants the Trapp&Matthies-like models offer good possibilities on the basis of Kow (representing contaminant) and lipid content (representing plant).

We do not have list with limit values in soil to protect humans from vegetable consumption. We have, however, a procedure to deal with risks from exposure through vegetable consumption, see link hereunder.

<http://www.rivm.nl/bibliotheek/rapporten/711701040.html>

Actually, there is a lot of knowledge you could benefit from. Conservative calculations of 1. uptake in crops and 2. consumption rates, give you quite a good idea of high end estimates of risk. There is one little problem: while for organic contaminants you can have them all (just using the Koc), but for metals you need (significant) empirical relations that are only available for a limited number of metals.

When you speak of 'result obtained' are you referring to concentrations in vegetables? If yes: which vegetables?! You probably know that uptake differs, up to several orders of magnitude, between vegetables. Spinach, lettuce and broccoli have the highest uptake.

We have done a lot of studies on uptake of contaminants by crops. The question is: what kind of info do you need? Please give some more details.

#### **United Kingdom / Paul Nathanail & Paul Bardos (30.01.2013)**

The UK gac (sgv from the environment agency and the lqm/cieh values) consider plant uptake for about 90 substances in total.

Could you ask Ana for the name of the substances and if possible the levels she found IN the produce and attached ON the produce (we would consider both pathways).

Btw it may be the foods we consider are not the same as those in the Basque country. Details are in the environment agency SR3 report and in the clea model and handbook.

<http://environment-agency.resultspage.com/search?p=UK&srid=S8-UKLD01&lbc=environment-agency&ts=ev2&pw=SR3%20report&pu=110300&uid=399113044&isort=score&w=sr3&rk=2>

This discussion has come up several times in the UK. I believe that a lot of modelling work has been carried out under CLEA on plant uptake and this includes what limit values there are on food metal limits. Paul Nathanail would be the person to best direct you.

There have also been a lot of studies carried out in the village of Shipham (<http://www.bgs.ac.uk/mendips/localities/shipham.html>) in the 1980s to 1990s. These did detect some impacts on blood samples from home grown vegetables and people were advised not to eat leafy vegetables from their gardens. I am not sure how well this advice was followed. Here is a 1979 study:

[http://www.hsph.harvard.edu/mining/files/EVIDENCE\\_OF\\_CADMIUM\\_TOXICITY\\_IN\\_A\\_POPULATION\\_LIVING\\_IN\\_A\\_ZINC-MINING\\_AREA.pdf](http://www.hsph.harvard.edu/mining/files/EVIDENCE_OF_CADMIUM_TOXICITY_IN_A_POPULATION_LIVING_IN_A_ZINC-MINING_AREA.pdf).



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A 2012 review of “Human Health Risk Assessment of the implications of metal contamination of water sources around Leadhills and Wanlockhead collects a lot of the available evidence from Shipham and other places:

<http://www.nhsdg.org.uk/Documents/RiskAssessment.pdf>.

Forest Research in the UK have been looking at a legacy mining area in the Tamar Valley in England (and other areas), and have a lot of experience in mitigation technologies for diffuse soil contamination. Contacts: Tony Hutchings and Frans de Leij (cc'd to this e-mail). They have developed modified charcoals (from biochar) that provide long term stabilisation of metals and reduced uptake by vegetation, which I think Pierre Menger and I have mentioned to you before in the context of the HOMBRE project.