



Analysis of food for residues of pesticides: current situation, challenges and perspectives

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96% of the samples analysed by the official control laboratories in the EU are compliant with the maximum residue limits (MRLs).

Nevertheless, pesticide residues are considered as the number one risk associated with food by the German consumers (results of survey, Eurobarometer, 2006)

Is it fair?

To analyse it we shall look at:

- ✓ **MRL legislation**
- ✓ **Results of official labs**
- ✓ **Results of private labs**
- ✓ **Analytical methods**
- ✓ **Analytical gaps**

MRLs legislation

EU Regulation 396/2005 for the MRLs was put into force in September 2008.

Its main profit is the harmonization of the MRLs within the E.U.

**For products with no specific
MRL in this Regulation:**

a default value 0.01 mg/kg is used. This can be considered as «no desired residues», as this concentration is the limit of quantitation (LOQ) for many pesticides.

http://ec.europa.eu/sanco_pesticides/public/index.cfm :

- ✓ the MRLs for the various food – pesticide combinations are displayed.**
- ✓ However, this database has no legal value. The official MRLs are to be found in the Official Journal of the E.U.**

In the MRL definition:

**often metabolites and
degradation products are
included, e.g.:**

**✓ for fenthion, 5 more compounds
except the parent molecule are
included.**

The uncertainty of the result, in cases of MRL exceedances

**is considered as 50% of the result,
e.g.:**

Result = 0.6 mg/kg

U = 0.3 mg/kg

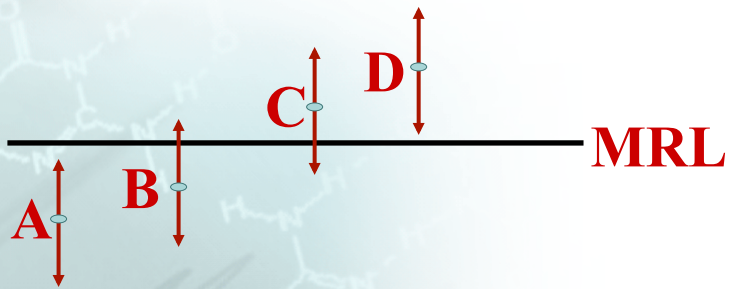
Violative is a sample with:

(residues - U) > MRL,

e.g. for the above example if:

(0.6-0.3) mg/kg > MRL

Examples of result \pm Uncertainty



Violative in official controls is considered only sample 'D'

MRLs are not based only on toxicological data,

therefore not all food with MRL violations can harm consumer's health.

However,

The synergistic effects of several residues below MRLs in a food:

is not yet clear, if it can lead to health impairments.

Work is currently underway to develop a uniform concept on European level for the assessment of cumulative risk of residues.

Such cases of samples, with multiple residues:

account for 26% of ~70.000 samples of the official controls in the E.U.

The maximum number of pesticides detected in a single sample was 22 (2007) in the E.U. and 16 in Greece (2008).

Food products of Integrated Pest Management (IPM)

fall usually in between organic and conventional foods in both:

- ✓ **frequency of residues**
- ✓ **residue levels**

IPM food is also less likely to contain multiple residues than conventional food.

However, not even the organic food is free of residues

Most of residues in organic food can be explained as:

- ✓ **environmental contamination**
- ✓ **drift of pesticides from adjacent non-organic farms**

Results of the laboratories

1. Results by the EU monitoring laboratories:

The results of 2006 are shown in the following table.

Significant differences observed between countries are not due to differences in the food quality!

Results in EU, (2006)

COUNTRY	No of samples	No of compounds	% not detected	% ≤MRL	% > MRL
GERMANY	15372	683	36	58	6
GREECE	2435	142	84	15	1
ITALY	7329	332	71	28	1
CYPRUS	305	144	58	34	8
NETH/NDS	3088	385	36	54	10
AVERAGE	total 65810	209	51	44	5

Results of pesticides monitoring in Greece, (2008)

	No of samples	No of Compounds	% not detected	% ≤ MRL	% > MRL
Benaki lab	440	228	72	22	5.7
Average of all (10 labs)	223	75	82	15	3.1

Transparency for pesticide residues has increased, thus:

- ✓ the results of EU monitoring program are on the internet
- ✓ the results & data of each state are on the internet
- ✓ many EU countries name traders, producers, or supermarkets with residues violations

2. Results from private laboratories

Such data are usually not available due to:

- ✓ reasons of confidentiality
- ✓ costs of statistical treatment

However data exist, e.g. the **Greenpeace** results, that show as products with multiple residues & frequently exceeding MRLs:

- ✓ sweet peppers
- ✓ tomatoes
- ✓ leaf salads
- ✓ grapes
- ✓ berries
- ✓ peaches, nectarines

In the same study of **Greenpeace** a decrease was observed in the frequency of residues.

Thus, grapes with no detectable residues increased:

- **from 6% in 2005 and 2006**
- **to 10% in 2007.**

and MRL violations in grapes decreased from 54% in 2005 to:

- **47% in 2006**
- **8% in 2007**

Food chain stakeholders set strict specifications in food

for offering better quality products to their customers, e.g.:

- ✓ **maximum number of pesticides per sample (e.g. 5/sample)**
- ✓ **lower MRLs at, e.g. half of the EU ones.**

They also ask from the laboratories:

- ✓ **fast results**
- ✓ **low analysis cost**
- ✓ **large number of compounds**
- ✓ **analysis of all kinds of food samples**

These make difficult the life of private laboratories' people.

Analytical part

More than 1300 pesticides can potentially be used in agriculture

However,

not all of them are detected by E.U. monitoring laboratories.

The average number of pesticides analysed by E.U. monitoring labs

corresponds to ~ 220 compounds per country.

The total number analysed by all the E.U. official labs, is ~900 compounds.

For an effective analysis, a multiresidue method is required.

Up to 500 compounds can be covered with a multiresidue method .

However only leading state or private laboratories analyse for so many compounds.

Group specific methods are also used, e.g. for:

- ✓ dithiocarbamates
- ✓ acidic compounds
- ✓ quat's (chlormequat, mepiquat, paraquat)

Single residue methods (SRMs) are also used, e.g. for

- ✓ glyphosate
- ✓ amitraz

Many of the new pesticides are analysed by SRMs.

However the use of SRMs increases dramatically the cost of analysis.

On the other hand a significant analytical gap is created from:

- ✓ the non use of SRMs and
- ✓ the use of multi methods for limited number of pesticides

Conclusions & tasks

1. Analytical capabilities have increased dramatically, and will continue to do so.

➤ **The result of this will soon be food not free of pesticides, as extremely low levels (<10ppb), are now detected.**

Conclusions & tasks

2. Such low concentrations, although <MRL, may still be a problem for the stakeholders.

3. But, ...

important pesticides are not always analysed.

Conclusions & tasks

4. Our efforts should be focused on transparency & good information of producers & consumers.