RISK ASSESSMENT FOR HEALTH OF PESTICIDES FROM FOOD IN ROMANIA,
2002

B.A. Hura¹, C.Hura², D.Strutinschi²

¹Electrotechnic Faculty, Technical University ‘Gh. Asachi’,
53, D. Mangeron Street, 6600 Iassy, Romania,
Phone: (40) 232 130718, E-mail: bogdanhura@rol.ro

²Food Toxicology Laboratory, Institute of Public Health,
14, V.Babes Street, 6600 Iassy, Romania,
Phone: (40) 232 410399, Fax: (40) 232 210399, E-mail: chura@iasi.mednet.ro,

ABSTRACT
The intensive pollution of environment as well as the synthesized of new chemical substance
which are introduced on the market, drive to the chemical pollution of food, so that some
chemical substances can be toxic, mutagenic or carcinogenic having the negative effects
upon human health. The aim of the present study was to investigate the variation of
organochlorine pesticide residues in some foods on Eastern Romania area in 2002 period.
The organochlorine pesticide residues were analyzed using gas chromatography method.
DDT-total and HCH-total were determined in milk, meat, fish, vegetables, daily diets
sampled on Eastern Romania area. The pesticide residues were found in all analyzed
samples. Generally, a wide variation between individual samples was observed. The mean
residues levels of HCH-total varied between 144.2 ?g/kg (vegetables) and 824.3 ?g/kg
(meat products). DDT-total varied between 108.2 ?g/kg (vegetables) and 759.7 ?g/kg (meat
products). The results obtained emphasized that the organochlorine pesticide residues are
present in all analyzed foods.

INTRODUCTION
The concern about environmental contamination by persistent organochlorine pesticides
used both in agriculture and vector control has led many countries to investigate the
magnitude of their own environmental pollution. Pesticides play an important role in
agriculture as well as in pest control. In view of adverse health effects frequently inadequate
pesticide application such as poor health protection or excessive dosage is responsible. In
addition, health effects are also reported in cases of indoor low-dose pesticide applications
carried out under correct safety conditions.
Even since humans have become aware that health is inseparably liked to an impact and
healthy environment, the control and reduction of pollution have become the focus of
worldwide concern. For instance, numerous human activities represent possible sources of
pollution: industrial processes, transportation industrial and municipal waste disposal and
incineration and waster water treatment.
Investigations on possible health and environmental hazards involved have led many
industrial countries to restrict or ban the use of these chemicals (pesticides, and others) and
enforce the tolerance levels for the residues in food and human body.
The authors present the research results obtained in 2001-2002 period of some chemical pollutants with cancer risk (organochlorine pesticides residues) in some food from Eastern Romania area.

**MATERIALS AND METHOD**

In 2002 period were analyzed the organochlorine pesticide residues in foods from Eastern Romania area.

Organochlorine pesticide residues: DDT total [(op+pp') DDE, DDD, DDT] and HCH total (alpha, gamma, beta, delta) were analyzed used gas-chromatographic method.

A HP/ GC-ECD was equipped with column (680 HP). Injector and detector temperatures were 240ºC and 325ºC respectively. Column temperature was 200 ºC. One µl was injected.

Food analyzed were: meat products – salami, dairy products – milk, cheese, cream, vegetables – lettuce, carrot, potatoes, cabbage and fruits - apples

**RESULTS**

Organochlorine pesticides residues were found present in all analyzed samples. Generally, a wide variation between individual samples was observed. The results were examined in relation to differences in living conditions with regard to agricultural activities, dietary habits and reported use of pesticides in the various sampling areas.

The mean levels of organochlorine pesticide residues in food in Eastern Romania area are present in Table 1, Table 2, Table 3, Table 4.

Table 1 presents the mean levels of organochlorine pesticide residues in food (meat product, dairy product and vegetables) in Romania area, in 2002. The mean levels of HCH/total varied between 144.2 µg/kg (vegetables) and 824 µg/kg (meat) and the mean levels of DDT-total varied between 108.2 µg/kg (vegetables) and 759.7 µg/kg (meat).

<table>
<thead>
<tr>
<th>Produs</th>
<th>Nr. samples</th>
<th>HCH- total</th>
<th>DDT-total</th>
<th>Total Pesticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat products</td>
<td>39</td>
<td>824.3</td>
<td>759.7</td>
<td>1584.0</td>
</tr>
<tr>
<td>Dairy products</td>
<td>30</td>
<td>514.8</td>
<td>314.1</td>
<td>828.9</td>
</tr>
<tr>
<td>Vegetables and fruits</td>
<td>50</td>
<td>144.2</td>
<td>108.24</td>
<td>252.44</td>
</tr>
</tbody>
</table>

**a. Meat products**

Table 2 presents the mean levels of organochlorine pesticide residues in meat products (some assortment of salami). The mean levels of HCH total were 824.3 µg/kg and DDT total were 759.7 µg/kg.

<table>
<thead>
<tr>
<th>Product (salami)</th>
<th>Nr. samples</th>
<th>HCH- total</th>
<th>DDT-total</th>
<th>Total Pesticide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salam de vara</td>
<td>10</td>
<td>902.9</td>
<td>288.7</td>
<td>1191.6</td>
</tr>
<tr>
<td>Parizer</td>
<td>10</td>
<td>945.9</td>
<td>1532.7</td>
<td>2478.6</td>
</tr>
<tr>
<td>Cârnati casa</td>
<td>10</td>
<td>638.5</td>
<td>603.8</td>
<td>1242.3</td>
</tr>
<tr>
<td>Carne tocata</td>
<td>9</td>
<td>810.0</td>
<td>613.5</td>
<td>1423.5</td>
</tr>
<tr>
<td>Total meat products</td>
<td>39</td>
<td>824.3</td>
<td>759.7</td>
<td>1584.0</td>
</tr>
</tbody>
</table>

The mean levels of isomers of HCH (alfa, beta, gamma, delta) are present in Fig.2. The mean levels of alfa HCH isomer was 429.7µg/kg and the mean levels of beta HCH isomer was 217.6 µg/kg in meat products.
Fig. 2 – The mean of HCH- total and isomers, in meat products, 2002, µg/kg

Fig. 3 presents the mean levels of the metabolites of DDT: (op+pp)DDE,(op+pp) DDD, (op+pp)DDT, in some assortment of salami analyzed in 2002. The mean levels of (op+pp) DDT metabolites were 290.2 µg/kg and the mean levels of (op+pp) DDD were 142.7 µg/kg in meat products.

Fig. 3 – The mean of DDT- total and metabolites, in meat products, 2002, µg/kg

b. Dairy products

Table 3 presents the mean levels of organochlorine pesticide residues in dairy products (milk, cream, cheese). The mean levels of HCH total were 514.8 µg/kg and DDT total were 314.1 µg/kg.

<table>
<thead>
<tr>
<th>Product</th>
<th>Nr. samples</th>
<th>HCH-total</th>
<th>DDT-total</th>
<th>Total Pesticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>10</td>
<td>67.2</td>
<td>47.8</td>
<td>115.0</td>
</tr>
<tr>
<td>Cream</td>
<td>10</td>
<td>936.6</td>
<td>679.3</td>
<td>1615.9</td>
</tr>
<tr>
<td>Cheese</td>
<td>10</td>
<td>540.5</td>
<td>215.1</td>
<td>755.6</td>
</tr>
<tr>
<td>Total dairy products</td>
<td>30</td>
<td>514.8</td>
<td>314.1</td>
<td>828.9</td>
</tr>
</tbody>
</table>

The high mean levels of the pesticide residues were in the cream samples (1615.9 µg/kg) and the low mean levels were in the milk samples (115 µg/kg), Fig. 4.

Fig. 4 – The mean of total organochloride pesticide residues, in dairy products, 2002, µg/kg

The mean levels of isomers of HCH (alpha, beta, gamma, delta) are present in Fig. 5. The mean levels of alpha HCH isomer was 196.8 µg/kg and the mean levels of beta HCH isomer was 154.1 µg/kg in dairy products.
Fig. 5 – The mean of the HCH-total and isomers, in dairy products, 2002, µg/kg

![Bar chart showing the mean levels of HCH-isomers in dairy products, 2002, µg/kg.]

Fig. 6 presents the mean levels of the metabolites of DDT: (op+pp)DDE, (op+pp)DDD, (op+pp)DDT, in some assortment of dairy products analyzed in 2002. The mean levels of (op+pp) DDT metabolites were 203.8 µg/kg and the mean levels of (op+pp) DDD and (op+pp)DDE) were 55.8 µg/kg and 54.5 µg/kg respectively in dairy products.

![Bar chart showing the mean levels of DDT metabolites in dairy products, 2002, µg/kg.]

c. Vegetables and fruits

Table 4 presents the mean levels of organochlorine pesticide residues in vegetables and fruits. The mean of HCH total and DDT total residues varied between 120.4 µg/kg (potatoes) and 169.8 µg/kg (carrot) for HCH total and 92.8 µg/kg (carrot) and 197.8 µg/kg (potatoes) for DDT total. In the apple the mean residues of HCH total were 148.5 µg/kg and DDT total were 32.1 µg/kg, Fig. 7.

<table>
<thead>
<tr>
<th>Product</th>
<th>Nr. samples</th>
<th>Total HCH</th>
<th>Total DDT</th>
<th>Total Pesticide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettuce</td>
<td>10</td>
<td>123.4</td>
<td>114.6</td>
<td>238.0</td>
</tr>
<tr>
<td>Carrot</td>
<td>10</td>
<td>169.8</td>
<td>92.8</td>
<td>262.6</td>
</tr>
<tr>
<td>Potatoes</td>
<td>10</td>
<td>120.4</td>
<td>197.8</td>
<td>318.2</td>
</tr>
<tr>
<td>Cabbage</td>
<td>10</td>
<td>158.9</td>
<td>103.9</td>
<td>262.8</td>
</tr>
<tr>
<td>Apple</td>
<td>10</td>
<td>148.5</td>
<td>32.1</td>
<td>180.6</td>
</tr>
<tr>
<td>Total vegetables</td>
<td>50</td>
<td>144.2</td>
<td>108.24</td>
<td>252.44</td>
</tr>
</tbody>
</table>

Table 4 - The mean of the organochloride pesticide residues in vegetables, 2002, µg/kg

The mean levels of isomers of HCH (alfa, beta, gamma, delta) in vegetables are present in Fig. 8. The mean levels of alfa HCH isomer were 87.0 µg/kg and the mean levels of beta HCH isomer were 37.1 µg/kg in vegetables and fruits.

![Bar chart showing the mean levels of HCH isomers in vegetables, 2002, µg/kg.]

Fig. 7 - The mean of the organochloride pesticide residues, in vegetables, 2002, µg/kg

![Bar chart showing the mean levels of pesticides residues in vegetables, 2002, µg/kg.]

Fig. 6 – The mean of the DDT-total and metabolits, in dairy products, 2002, µg/kg

![Bar chart showing the mean levels of DDT metabolites in dairy products, 2002, µg/kg.]

(c) Vegetables and fruits

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Fig. 8 presents the mean levels of the metabolites of DDT: (op+pp)DDE, (op+pp) DDD, (op+pp)DDT, in some assortment of vegetables and fruits. The mean levels of (op+pp) DDT metabolites were 70.4 µg/kg and the mean levels of (op+pp) DDD and (op+pp)DDE were 26.2 µg/kg and 11.64 µg/kg respectively in vegetables.

CONCLUSIONS
1. The results gives emphasis that the organochlorine pesticide residues are present in all food analyzed.
2. The presence of these pollutants in food required to continue the analyzed of these in the aim respected MAL and the reduction their presence in food.
3. The determinations of the chemical pollutants in food are important in environmental monitoring for the prevention, control and reduction of pollution as well as for occupational health, legal decisions and epidemiological studies.

REFERENCES
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4. OMS, Recommandation pour l'etudes de quantites de contaminants chimique apportees par l'alimentation. (1996)