

CHEMICAL CONTAMINANTS IN FOOD FROM ROMANIA AREA, 2001 - 2002, RISK FOR CANCER DISEASE

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ABSTRACT

The intensive pollution of environment as well as the synthesis of new chemical substances, which are introduced on the market, drives to the chemical pollution of food, so that some chemical substances can be toxic, mutagen or carcinogenic having the negative effects upon human health.

The aim of the study was to investigate the variation of some chemical pollutants with cancer risk (nitrate/nitrite, heavy metals) in some food (vegetables, meat, milk, fish, daily diets) from the Romania area, in 2001- 2002 period.

In dairy products, vegetables, meat product and total diets were analyzed the metals (Cd, Pb, Zn, Cu, Ni, Mn, Fe) by atomic absorption spectrophotometer method. The nitrate/nitrite were determined by colorimetric method.

In all analyzed samples these chemical contaminants were found. Generally, wide variations between in individual samples were observed. The mean levels of Pb, Cd, Cu, Zn, in vegetables, meat and total diets were in admissible limits.

The determination of chemical contaminants 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.

INTRODUCTION

Ever since human have become aware that health is inseparably linked to an impact and healthy environment, the control and reduction of pollution have become the focus of worldwide concern. Investigation on possible health and environmental hazards involved have led many industrial countries to restrict or ban the use of chemicals (pesticides, heavy metals) and enforce the tolerance levels for the residues in food and feed.

Food means essential products for human life, being considered as an environmental element. Generally, a food has a chemical composition, well determined and knows the nutritive substances, which it contains providing by complex, processes the necessary energy of vital functions for the living organisms. Usually food must be pure, proper from the viewpoint of natural chemical composition, therefore to lock foreign substances which modify the nutritive value or which have dangerous effects upon the organism. The intensive pollution of environment as well as the synthesis of new chemical substances that are introduced on the market, drives to the chemical pollution of food, so that some chemical substances can be toxic, mutagenic or carcinogenic having the negative effects upon human health. During the "National Program for Health in Relation with Environment" we proposed the project "Monitoring of chemical contaminants of food in Romania area" in 2001 – 2002

period. During this project we continued the determination of some chemical contaminants: nitrites/nitrates, heavy metals in various food consumed on the populations from Romania area [1,2,3,4].

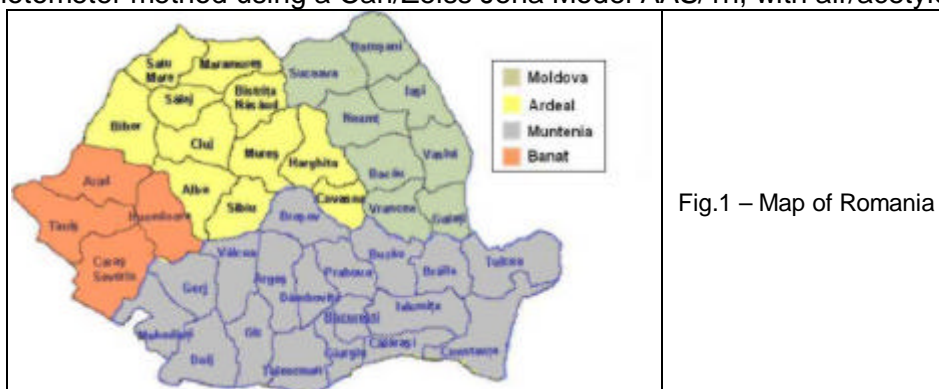
The aim of the present study was to investigate the variation of these chemicals contaminants in some foods from Romania area, in 2001- 2002

MATERIAL AND METHODS

The investigated foods contaminants were: nitrates/nitrites and heavy metals [Cu, Cd, Pb, Mn, Zn, Ni] in **vegetables** [carrot, cabbage, potatoes, radish, spinach, lettuce], **meat products** [salamis], **dairy products** [milk, cheese], **diets**. The foods were harvested from the Romania area (Ardeal, Banat, Moldova, Muntenia) (Fig.1).

-Nitrates/nitrites concentrations were analyzed by colorimetric method.

-Heavy metals (Cu, Zn, Cd, Pb, Mn, Ni) were analyzed by atomic absorption spectrophotometer method using a Carl/Zeiss Jena Model AAS/1n, with air/acetylene flame.



RESULTS

In all analyzed samples these chemical pollutants were found. Generally, wide variations between in individual samples were observed. The concentration of the nitrates/nitrites and the heavy metals [Pb, Cd, Cu, Mn, Zn and Ni] were investigated in 5386 food samples (vegetables (1364 samples), meat and meat products (2743 samples), milk and dairy products (952 samples), fish (55 samples), total diets (327 samples)).

A. Nitrates/nitrites

The variation of the content of nitrate/nitrite on food product harvested in the Romania area, during 2001 - 2002 period can be observed from Fig.2, Fig.3, Fig 4, Fig.5, Fig.6 which showed a great variation from a product to another but in the admitted limits. The concentrations of the nitrates/nitrites were investigated in 4731 food samples: vegetables (1344 samples), meat products (2420 samples), milk and dairy products (703 samples) and total diets (264 samples), Fig.2.

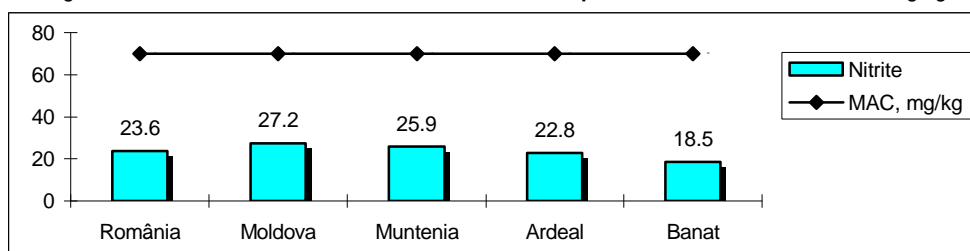
Fig.2- The distribution of the food samples for **nitrates/nitrites**, on products category, România, 2002



The variation of the content of nitrate/nitrite on food product harvested in the Romania area (Ardeal, Banat, Moldova, Muntenia area), during 2002 period, can be observed from Fig.3, Fig.4, Fig 5, Fig.6 which showed a great variation from a product to another but in the admitted limits. The averages content of nitrate/nitrite in meat products were between the

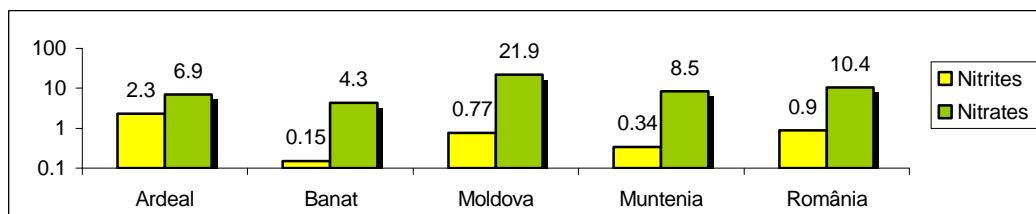
admitted limits (70 mg/kg) as it can be observed from Fig.3. The mean levels of nitrites concentration in meat products varied between 18.5 mg/kg Banat region and 27.2 mg/kg Moldova region.

Fig.3 – The mean nitrates/nitrites concentration, in **meat products**, from România, 2002, mg/kg



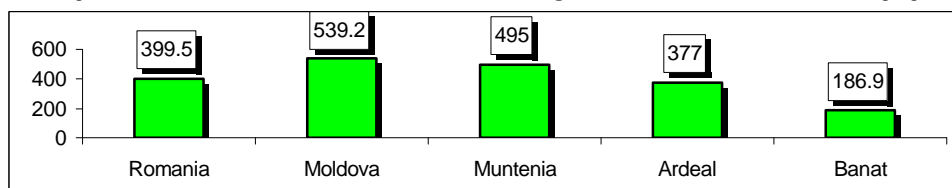
The average content of nitrate/nitrite the **dairy products** were between the admitted limits as it can be observed from Fig.4. The mean levels of nitrites concentration in dairy products varied between 0.15 mg/kg Banat region and 2.3 mg/kg Ardeal region and the nitrates concentration varied between 4.3 mg/kg Banat region and 21.9 mg/kg Moldova region, in the admissible limits (50 mg/kg).

Fig.4 - The mean nitrates/nitrites concentration in **dairy products** from România, 2002, mg/kg



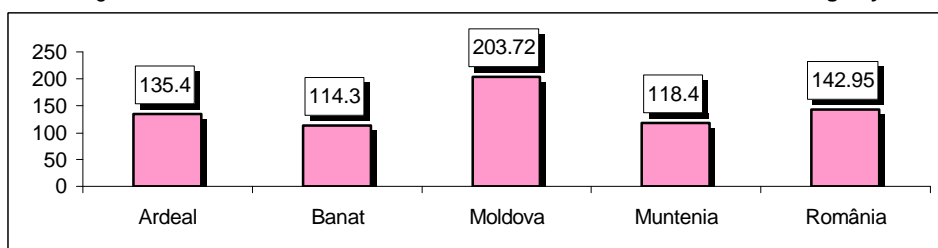
The results of nitrates/nitrites concentrations in 1344 **vegetable** samples [carrot, cabbage, potatoes, radish, spinach, lettuce] are present in Fig.5. The highest levels of nitrites/nitrates were registered in Moldova region (539.2 mg/kg), and the low levels of nitrates/nitrites were in Banat region (186.9 mg/kg).

Fig.5 – The mean nitrates/nitrites concentration in **vegetables** from România, 2002, mg/kg



The averages content of nitrates/nitrites in daily diets were the highest in the Moldova region and the lower levels of nitrites were obtained in Banat region (Fig.6). In daily diets the mean levels of nitrates varied between 203.72 mg/day (Moldova) and 114.3 mg/day (Banat).

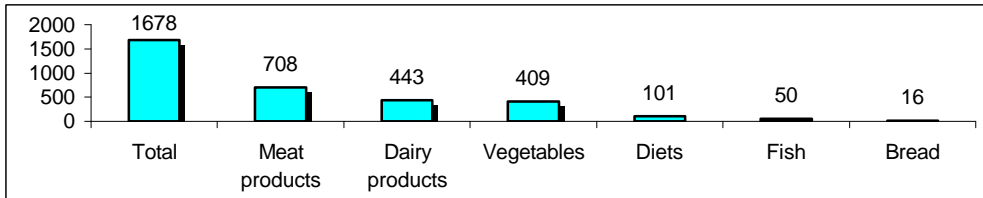
Fig.6 - The mean nitrates/nitrites concentration in **diets** from România, 2002, mg/day



B. Heavy metals

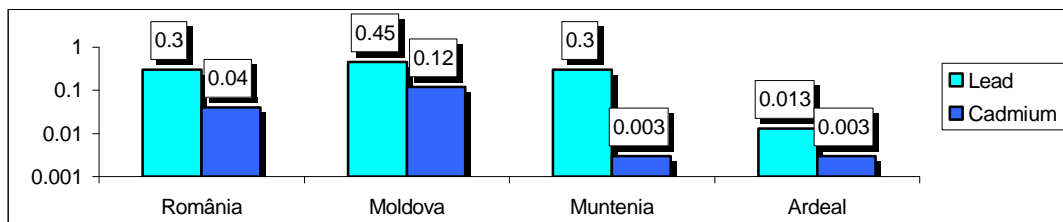
The results were distinguished the presence of heavy metals in food analyzed. The mean levels of Cd, Pb in meat products, vegetables, dairy products and diets samples are presented in Fig.7, Fig.8, Fig.9, Fig.10, Fig.11, Fig.12, Fig.13. The concentration of the heavy metals [Pb, Cd, Cu, Mn, Zn and Ni] were investigated in 1678 food samples: (vegetables (409 samples), meat products (708 samples), milk and dairy products (443 samples), fish (50 samples), total diets (101 samples) and bread (16 samples), Fig.7.

Fig.7 –The distribution of the food samples for heavy metals, on products category, Romania 2002



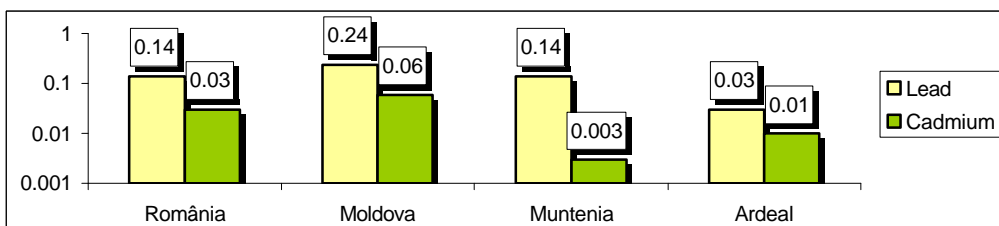
The results were distinguished the presence of heavy metals in food analyzed. The mean levels of Cd, Pb in the meat samples is presented in Fig.8. The mean levels of Cd in meat products were in admissible limits (MAC= 0.75 mg/kg). The mean levels of Pb in meat products were in the maximum admissible limits in Romania (MAC= 0.5 mg/kg) varying between 0.013 mg/kg in Banat region and 0.45 mg/kg in Moldova region (Fig .8).

Fig.8 – The mean concentration of lead and cadmium, in meat products from România, 2002, mg/kg



The mean levels of Cd, Pb in the dairy samples is presented in Fig.9. The mean levels of Pb in dairy products were in admissible limits, the mean levels of Pb varied between 0.24 mg/kg (Moldova) and 0.03 mg/kg (Banat) and the mean levels of Cd in dairy products were in the maximum admissible limits in Romania, varying between 0.003 mg/kg in Muntenia region and 0.24 mg/kg in Moldova region (Fig .9).

Fig.9 - The mean concentration of heavy metals in dairy products ,from România, 2002, mg/kg



The mean levels of Pb, Cd in vegetables samples is presented in Fig.10 and Fig 11. The mean of Cd and Pb levels in vegetables were in admissible limits. The mean levels of Pb were in admissible limits, and varied between 0.05 mg/kg (Ardeal region) and 0.26 mg/kg (Moldova region), Fig.10. The mean levels of Cd were in admissible limits and varied between 0.06 mg/kg (Muntenia region) and 0.03 mg/kg (Moldova region), Fig.11. The mean levels of Pb, Cd in diets samples are presented in Fig.12 and Fig. 13. The mean levels of Pb varied between 0.08 mg/day (Ardeal region) and 0.55 mg/day (Moldova region), Fig.12. The mean levels of Cd varied between 0.006 mg/day (Muntenia region) and 0.41 mg/day (Moldova region), Fig.13.

Fig.10 –The mean concentration of **lead in vegetables**, from România, 2002, mg/kg

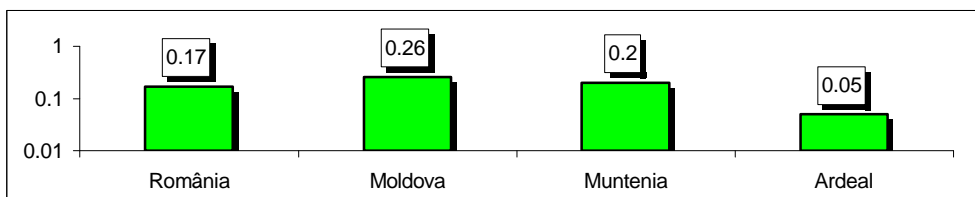


Fig.11 – The mean concentration of **cadmium of vegetables**, from România, 2002, mg/kg

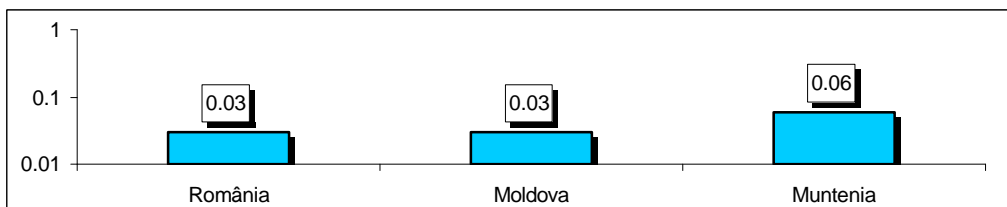


Fig.12 – The mean concentration of **lead in diets**, from România, 2002, mg/day

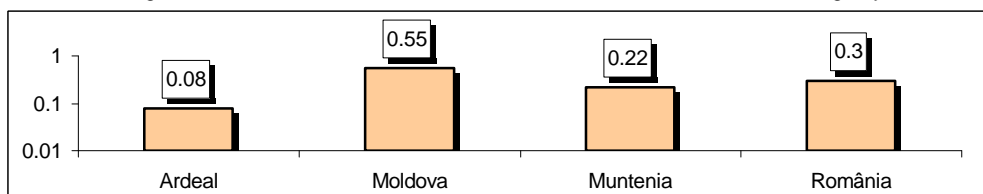
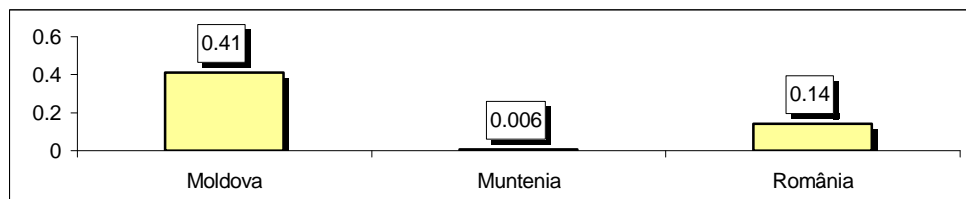


Fig.13 – The mean concentration of **cadmium in diets**, from România, 2002, mg/day



CONCLUSIONS:

1. Nitrate/nitrite contents were generally, in normal limits and the daily diets contained quantities below acceptable daily intake.
2. The analysis of results obtained showed that in food was found the heavy metals in varied concentrations.
3. The determinations of 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.

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